Ambu
Ideas that work for life

Clinical Evidence Compendium

Published studies, case reports and correspondence

July 2020

Ambu® AuraGain™

2nd Generation disposable laryngeal mask

Taking patient safety and airway managment efficiency to a new level

Contents

Abbreviations:

RCT	Randomised clinical trial
SAD/SGA	Supraglottic airway device
OLP	Oropharyngeal leak pressure
FB	Fibreoptic view
TT	Tracheal tube
AM	Airway manoeuvres
mL	Millilitre
ET/ETT	Endotracheal tube
LMA	Laryngeal mask airway
OSP	Oropharyngeal seal pressure
ASA	The American Society of Anaesthesiologists
ISP	Initial seal pressure
IQR	Interquartile range
PIP	Peak inspiratory pressure
BMI	Body mass index
MRI	Magnetic resonance imaging
FOB	Fibreoptic bronchoscopy

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Preface

Welcome to the first edition of the Ambu® AuraGain™ Clinical Evidence Compendium. This compendium is a collation of all the studies, including clinical trials, simulation studies, case series, reports, conference abstracts and correspondence, relating to this innovative airway management device, up to July 2020.

Since the launch in 2014, Ambu® AuraGain™ has been the subject of numerous peer-reviewed publications. The objective of this Evidence Compendium is to provide a brief summary of all known published data on AuraGain™, in an efficient and easy-to-understand manner. While each study summary is true to the original publication, the original copies can be made available upon request for a comprehensive overview. Should you wish to discuss any publication in this compendium in more detail, do not hesitate to drop an inquiry to: UKCA-Marketing@ambu.com.

In an effort to include all known data irrespective of the outcome, a systematic literature search on AuraGain™ has been conducted to generate the Evidence Compendium, giving the reader every opportunity to obtain a balanced overview of the clinical data that exists for AuraGain™. The study titles are taken from the publications as they appear in their original form, allowing the reader to make a perfectly accurate internet search should they wish to find out more.

We sincerely hope that this evidence compendium provides you with an understanding of the overall clinical landscape regarding AuraGain™ and facilitates your day to day evidence-based practice.

While every effort has been made to provide accurate information, we apologise in advance for any errors or omissions and will be pleased to make any corrections brought to our notice in any following editions.

"Ideas that work for life"

More than a tagline,
"Ideas that work for life" is everything we do

Ambu® AuraGain™

2nd Generation Disposable Laryngeal Mask

The AuraGain is Ambu's 2nd generation laryngeal mask, satisfying 3 fundamental airway management needs by integrating gastric access and intubation capability in an anatomically curved single-use device that facilitates the rapid establishment of a safe airway.

Rapid placement

The original anatomical curve is pre-formed to follow the anatomy of the human airway, and the soft rounded curve of the AuraGain ensures rapid placement and guarantees long-term performance.

High seal pressure

The thin and soft cuff of the AuraGain is designed to deliver high seal pressures - documented up to 40 cmH_2O.*

Gastric control

The integrated gastric access channel is designed with a low friction inner surface to facilitate easy placement of a gastric tube.

Introduce a gastric tube through the device and into the stomach of the patient to enable active and passive management of gastric content, and prevent gastric insufflation.

Integrated intubation capability

The AuraGain provides the added safety feature of intubation capability. This means that in case of an unexpected difficult airway, or a "Cannot Intubate – Cannot mask Ventilate" (CI-CV) situation, where the end-game is to intubate the patient, AuraGain can be used as a conduit for direct endotracheal intubation assisted by a flexible scope (such as the Ambu® aScope 4).

All-round versatility

Rapid placement, high seal pressure, gastric access, and intubation capability make the AuraGain the obvious and safe choice for every procedure where a laryngeal mask is indicated.

Updated max gastric tube recommendation

Ambu® has updated the max gastric tube recommendation printed on the device from 14 Fr to 16 Fr. The version with 14 Fr written on the device is fully compatible with gastric tubes up to 16 Fr.

Key Features

- Integrated gastric access channel for managing gastric content (Up to 16 French)
- The original anatomical curve, flexible cuve, ensuring rapid placement
- Intubating capability using standard ET-tubes
- Integrated bite absorption area prevents airway occlusion
- Navigation marks for guiding flexible scope
- Thin and soft cuff is designed to deliver high seal pressures - documented up to 40 cmH_2O*
- Can be used with an aintree catheter method
- LMA is documented with maximm ETT and Gastric Tube capacity
- Pilot balloon identifies mask size and provides tactile indication of degree of inflation
- MR safe
- Phthalate-free material
- Handy clip to keep the pilot balloon at bay while the LMA is being inserted
- Up to 70% cost savings against some like to like LMA's
- Available in 8 sizes

* data on file.

Guidelines & Consensus Documents

Recommendations for the use of the 2nd generation supraglottic airway devices

Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults[1]

"Second-generation SADs have advantages and are recommended; the ideal attributes of a SAD for airway rescue are reliable first-time placement, high seal pressure, separation of gastrointestinal and respiratory tracts, and compatibility with fibre-optically guided tracheal intubation."

"Second-generation SADs offer greater protection against aspiration than first-generation devices and are recommended should intubation fail during a rapid sequence induction."

"Plan B" emphasis maintaining oxygenation with an SAD:

- All anaesthetists should be trained to use and have immediate access to second-generation SADs;
- The use of an Aintree Intubation Catheter over a fibreoptic scope allows guided intubation through an SAD where direct fibre-optically guided intubation is not possible.

4th National Audit Project of the Royal College of Anaesthetists and Difficult Airway Society (NAP4)[2]

"The combination of improved sealing and the presence of a drain tube improves efficacy and creates functional separation of the gastrointestinal tract from the respiratory tract (like an artificial larynx) ... several recent publications have suggested that the use of SADs with effective drain tube should become a 'standard of care'. All hospitals should have second generation SAD available for both routine use and rescue airway management."

"If tracheal intubation is not considered to be indicated but there is some (small) increased concern about regurgitation risk a second generation SAD is a more logical choice, than a first generation one."

"Obstetric anaesthethist should be familar and skilled with SADs for rescuing the airway; particularly those designed to protect from aspiration and to facilitate ventilation and or intubation."

Consensus guidelines for managing the airway in patients with COVID-19[3]

"Single vs. reusable equipment: "Where practical, single-use equipment should be used."

"... when difficulty is encountered... A second-generation supraglottic airway device (SGA) for airway rescut (e.g. i-gel, Ambu AuraGain, LMA ProSeal, LMA Protector)."

"Airway management during cardiac arrest: "An SGA with a high seal pressure should be used in preference to one with a low seal. This will usually be a second-generation SGA where available."

Use of suproglottic airways during the COVID-19 pandemic[4]

"Use of a second-generation SGA is likely to improve airway seal."

"The drain port of a second-generation SGA may provide a potential route for secretion dispersal..."

COVID-19 Airway management principles[5]

"... a second-generation supraglottic airway device (SAD) for airway rescue, also to improve seal."

Staying Ahead of the Curve: Modified Approach to Emergency Caesarean Section Under General Anaesthesia in COVID-19 Pandemic[6]

"If not successful, ... 2nd generation supraglottic device should be inserted."

Supporting Evidence - Based practice with best available evidence

The Difficult Airway Society 'Airway Device Evaluation Project Team (ADEPT)' Guidance on selecting airway devices (Pandit *et al.*, 2011) emphasises the role of evidence-based decision making while purchasing airway devices. The core principle of Evidence-Based Practice is the hierarchy of evidence, which attempts to address "what is the best available evidence?" for a given clinical question. The ADEPT guidance defined Level 3 evidence (Figure 1) as the minimum level of evidence needed to make a pragmatic decision about the purchase or selection of an airway device. As part of our on-going efforts to support evidence-based decision making, here we included a brief methodology and approach for generating this evidence compendium and the level of clinical evidence in Figure 1.

How were the studies selected?

Online academic databases and search engines including MEDLINE, Wiley Online Library, Cochrane Library, Science Direct & Google Scholar were searched for all relevant articles up to 1st June 2020. Articles published in the English language with clinical evaluation of the subject device and systematic literature review with meta-analysis were included. General reviews, book chapters and publications with no clinical data were excluded (Other articles).

334 relevant articles identified & screened

51 articles including **32** comparative studies & **1** network meta-analysis

The level of evidence in this evidence compendium is summarised below:

Levels of evidence

1 level

1 Meta-analysis

High-quality, RCT with adequate power; Meta-analysis or systematic review of these studies.

2 level

32 Prospective studies

Prospective, comparative studies; Lesser-quality RCTs; prospective cohort study; or systematic review of these studies.

3 level

0 Retrospective studies

Retrospective, pre-post treatment, cohort or case control studies; or systematic review of these studies.

4 level

4 Case studies

Case series, case reports.

5 level

14 Manikin & bench top

Expert opinion, editorials, white papers, bench top studies, manikin studies.

Figure 1. Evidence-based medicine hierarchies of evidence*

*(Adapted from Centre for Evidence-Based Medicine at: http://www.cebm.net/index.aspx?o=1025). Notwithstanding several other classifications of types of research evidence, this table represents a useful summary of categorisation.

Pandit, J. J. *et al.* (2011) 'The Difficult Airway Society "ADEPT" Guidance on selecting airway devices: The basis of a strategy for equipment evaluation', *Anaesthesia*, 66(8), pp. 726–737. doi: 10.1111/j.1365-2044.2011.06787.x.

AuraGain vs. i-gel

Comparison of the clinical performance of i-gel® and Ambu® AuraGain™ in children, a randomised non-inferiority clinical trial

Mihara et al., (2019). Eur J Anaesthesiol. 36(6), pp. 411–417.

2 level

Key Points

- **AuraGain: 21.9 ± 6.0** vs. i-gel 23.1 ± 7.3 — Oropharyngeal leak pressure
- **AuraGain: 96%** vs. i-gel 90% — Success rate
- **AuraGain: 100%** vs. i-gel 100% — Gastric tube insertion

Study Overview

An RCT to compare AuraGain™ & i-gel for:

- **Oropharyngeal leak pressure (OLP)**
- **First-attempt success rate**
- **Intra-operative airway obstruction**
- **Time to insertion (seconds)**
- **Ease of SGA & gastric tube insertion**
- **Postoperative complications**

Methods

The study comprised of: 98 children <12 years old, undergoing elective surgery with ASA physical status of I-III

AuraGain: 48 patients; size 1.5 (n=13), size 2 (n=30), size 2.5 (n=5)

i-gel: 50 patients; size 1.5 (n=21), size 2 (n=27), size 2.5 (n=2)

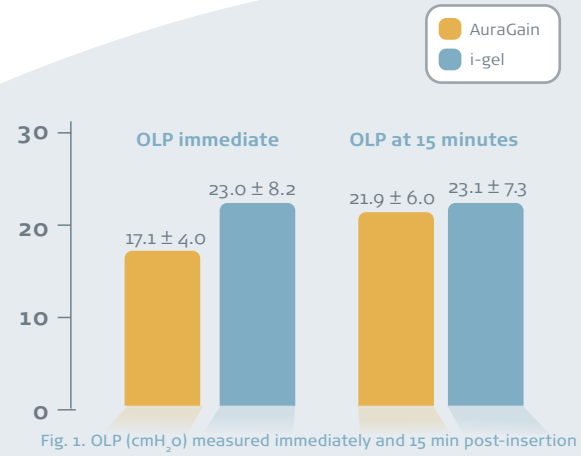

Fig. 1. OLP (cmH_2O) measured immediately and 15 min post-insertion

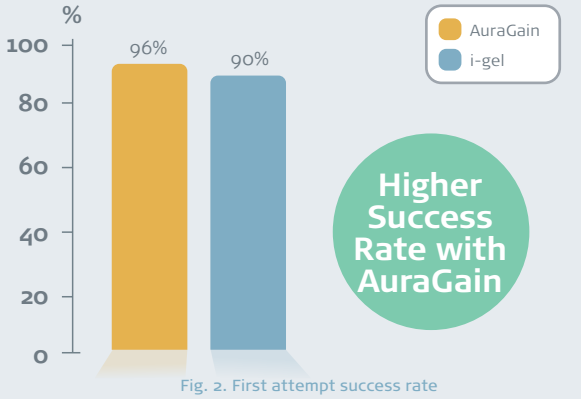

Fig. 2. First attempt success rate

Key Findings

1. The OLP (cmH_2O) measured immediately after insertion was higher in i-gel group, while there was no difference between groups 15 mins post-insertion (Figure 1).
2. AuraGain demonstrated higher first-attempt success rate: 96% vs. 90% in i-gel group (Figure 2).
3. AuraGain demonstrated lower intra-operative airway obstruction rate 1 (2%) vs. 4 (8%) in the i-gel group.
4. Time to insertion was 21.3 ± 6.5 seconds for AuraGain vs. 17.1 ± 4.5 seconds for i-gel.
5. The ease of SGA & gastric tube insertion were reported:
   - Ease of SGA insertion
     No resistance = AuraGain 90% vs. i-gel 88%
     Mild resistance = AuraGain 10% vs. i-gel 12%
   - Ease of gastric tube insertion
     Easy = AuraGain 100% vs. i-gel 100%
6. The postoperative (2 days after) complications i.e. cough & wheeze, were comparable between groups.

Conclusion

The OLP of the AuraGain and i-gel were comparable 15 minutes post-insertion. Although, i-gel demonstrated a shorter insertion time, the second insertion attempt, airway manipulation & intra-operative airway obstruction rates were higher in i-gel group. AuraGain & i-gel were comparable in terms of ease of SGA & gastric tube insertion as well as postoperative complications.

Reference: Mihara, T. *et al.* (2019) 'Comparison of the clinical performance of i-gel and Ambu AuraGain in children: A randomised noninferiority clinical trial', *European journal of anaesthesiology*. NLM (Medline), 36(6), pp. 411–417. doi: 10.1097/EJA.0000000000000987.

AuraGain vs. i-gel

A randomised controlled trial comparing Ambu® AuraGain™ and i-gel® in young paediatric patients

Kim, H.J. et al. (2019). Eur J Anaesthesiol. 36(10):721–7.

2 level

Key Points

- **Less AM with AuraGain** — Airway manoeuvers
- **AuraGain: 100%** vs. i-gel 97% — Success rate
- **AuraGain = better FB view** — Fiberoptic view

Study Overview

An RCT to compare AuraGain™ & i-gel for:

- **Requirement of additional airway manoeuvers (AM)**
- **Fibreoptic view* (FB)**
- **Time to device insertion (seconds)**
- **First-attempt success rate**
- **Oropharyngeal leak pressure (OLP)**
- **Ease of gastric tube insertion**
- **Complications**

Methods

The study comprised of: 67 children 6 months-6 years old, undergoing extremity surgery with ASA physical status of I-III

AuraGain: 34 patients; size 1.5 (n=17), size 2 (n=17)

i-gel: 33 patients; size 1.5 (n=16), size 2 (n=17)

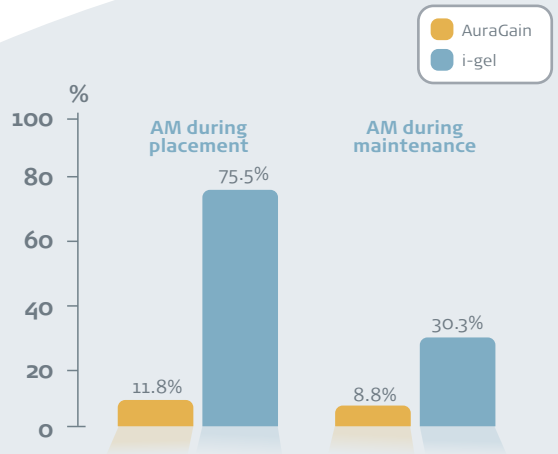

Fig. 1. Airway manoeuvres during placement & maintenance

Key Findings

1. AuraGain group required significantly less additional airway manoeuvres vs. i-gel group (Figure 1).
2. AuraGain group demonstrated significantly better fibreoptic view vs. i-gel group:

Fibreoptic view score (%)	1	2	3	4	5
AuraGain	35.3	35.3	23.5	2.9	2.9
i-gel	18.2	21.2	33.3	18.2	9.1

3. Time to device insertion was 13.3 ± 3.7 for AuraGain vs. 13.1 ± 4.9 seconds for i-gel.
4. AuraGain demonstrated higher first-attempt success rate: 100% vs. 97% in i-gel group (Figure 2).
5. The OLP (cmH_2O) was higher in i-gel group: 23.3 ± 4.6 vs. 18.6 ± 4.2 in AuraGain group.
6. The ease of gastric tube insertion was comparable between groups.
7. Bronchospasm occurred in 15.2% of the patients in i-gel vs. 5.9% in the AuraGain group.

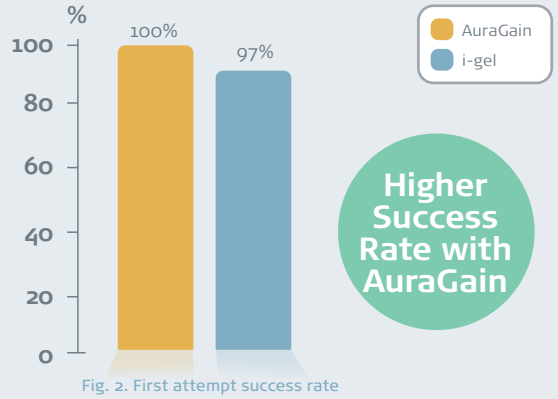

Fig. 2. First attempt success rate

*Brimacombe grading scale: Grade 1, only larynx seen; Grade 2, larynx and epiglottis posterior surface seen; Grade 3, visual obstruction of the epiglottis to the larynx <50%; Grade 4, visual obstruction of the epiglottis to the larynx >50%; and Grade 5, epiglottis down-folded, and the larynx cannot be seen directly.

Conclusion

AuraGain required significantly less AM and provided better FB view. AuraGain & i-gel were comparable in terms of time to device insertion, first-attempt success rate, ease of gastric tube insertion as well as postoperative complications. Although both devices provided effective ventilation even with epiglottic down-folding, AuraGain was considered a better conduit for intubation.

Reference: Kim, H. J. *et al.* (2019) 'A Randomized Controlled Trial Comparing Ambu AuraGain and i-gel in Young Pediatric Patients', *Journal of Clinical Medicine*. MDPI AG, 8(8), p. 1235. doi: 10.3390/jcm8081235.

AuraGain vs. i-gel

Fibreoptic intubation of severely obese patients through supraglottic airway: a prospective, randomised trial of the Ambu® AuraGain™ laryngeal laryngeal mask vs the i-gel™ airway

Moser, B. et al. (2019). Acta Anaesthesiol Scand. 36(10), pp. 721–727.

2 level

Key Points

AuraGain: 54 vs. i-gel 55 — Intubation time (seconds av.)

AuraGain: 77% vs. i-gel 64% — Gastric tube insertion (easy)

AuraGain: 32.8 ± 5.5 vs. i-gel 32.1 ± 5.9 — Oropharyngeal leak pressure

Study Overview

An RCT to compare AuraGain™ & i-gel for:

- **Time to SAD insertion (seconds)**
- **Trans-device ET intubation time (seconds)**
- **Oropharyngeal leak pressure (OLP)**
- **Ease of gastric tube insertion**
- **Gastric content volume (mL)**
- **First-attempt success rate for SAD & gastric tube**
- **Number of tracheal intubation attempts**

Methods

The study comprised of: 44 patients (BMI, 35 kg/m²), mean age 59, undergoing elective surgery with ASA physical status of I-III

AuraGain: 22 patients; size 4 women (n=12), size 5 men (n=10)

i-gel: 22 patients; size 4 women (n=15), size 5 men (n=7)

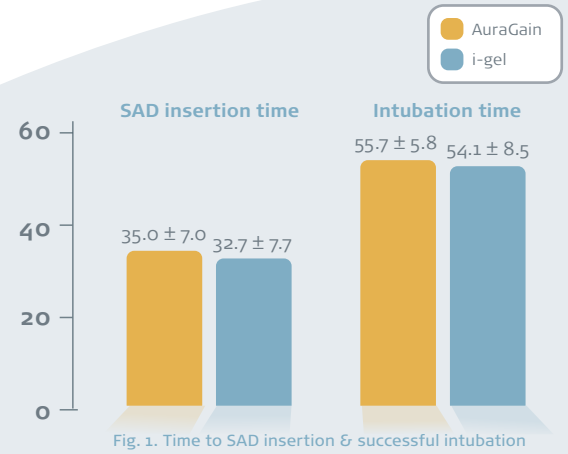

Fig. 1. Time to SAD insertion & successful intubation

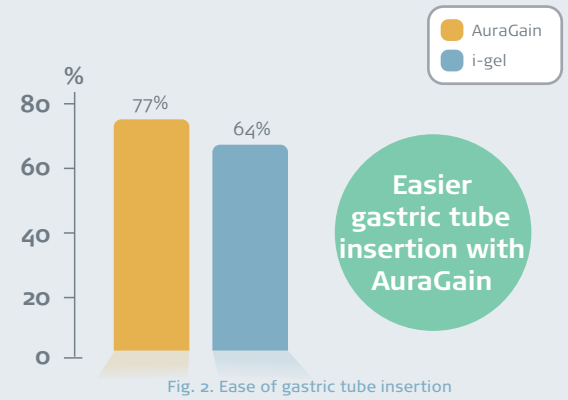

Fig. 2. Ease of gastric tube insertion

Key Findings

1. Time to SAD insertion and trans-device ET intubation were comparable between AuraGain and i-gel groups (Figure 1).
2. The OLP (cmH_2O) measured immediately after insertion was comparable between AuraGain (32.8 ± 5.5) & i-gel (32.1 ± 5.9).
3. Easier gastric tube insertion with AuraGain group (Figure 2):
   Easy = AuraGain 77% vs. i-gel 64%
   Little resistance = AuraGain 18% vs. i-gel 32%
   Significant resistance = AuraGain 5% vs. i-gel 5%
4. Gastric content volume was 8.4 ± 19.0 for AuraGain vs. 7.0 ± 10.2 for i-gel.
5. The first-attempt SAD insertion rate was 95% for AuraGain vs. 100% for i-gel; first-attempt gastric tube insertion rate was 100% for both groups.
6. First-attempt tracheal intubation rate was 91% and second attempt success rate was 9% for both groups.

Conclusion

Intubation time, OLP, gastric content volume, first-attempt SAD & gastric tube insertion rates and first-attempt tracheal intubation success rate were comparable between groups. It was easier to insert a gastric tube with AuraGain group. It was believed that AuraGain could be a good alternative in the airway management in obese patients.

Reference: Moser, B. *et al.* (2019) 'FiberopBc intubaBon of severely obese paBents through supragloHc airway: A prospecBve, randomized trial of the Ambu® AuraGain™ laryngeal mask vs the i-gel™ airway', *Acta Anaesthesiologica Scandinavica*. Blackwell Munksgaard, 63(2), pp. 187–194. doi: 10.1111/aas.13242.

AuraGain vs. i-gel

Evaluation of i-gel®, Ambu® AuraGain™ at low and high cuff-pressure for postoperative airway complications

Deepak, P. G. et al. (2020). Trends Anaesth Crit Care. 30: e32.

2 level

Study Overview

An RCT to compared AuraGain vs i-gel for:

- **Oropharyngeal leak pressure (OLP)**
- **Postoperative complications: immediate & postoperative day 1 & 2**

Methods

The study comprised of: 200 patients (age <60 years) undergoing elective laparoscopic surgery with ASA status I-II

AuraGain: 25 cmH_2O cuff pressure (AL) (n=67)

AuraGain: 60 cmH_2O cuff pressure (AH) (n=67)

i-gel (IG): (n=66)

Key Findings

1. OLP before and after pneumoperitoneum were similar in the three groups (IG- 24.22 ± 7.87 and 28.31 ± 8.52, AL-24.40 ± 5.84 and 26.94 ± 5.93, AH-25.02 ± 5.02 and 28.91 ± 5.6).
2. The overall incidence of postoperative sore throat among 3 groups was not significantly different (IG-5.7%, AL-14.9% and AH-17.9%; p=0.135) but dysphagia was seen only with AuraGain at high pressure in 4 patients (5.97%). No other upper airway complication was noted in the study.
3. There is no significant difference between the AuraGain at low cuff pressure and i-gel with respect to upper airway complications when the mean duration of surgery is under 75 minutes.

AuraGain™ Evidence Compendium

AuraGain vs. i-gel

Ambu® AuraGain™ and I-gel™ as barriers to dye placed in the oropharynx - a preliminary study

Sherif, M. J. et al. (2020). Trends Anaesth Crit Care. 30: e17–e18.

2 level

Study Overview

An RCT to evaluate AuraGain vs i-gel for:

- **Aspiration prevention**
- **Oropharyngeal leak pressure (OLP)**

Methods

The study comprised of 60 adults (age 18-65 years) with ASA status I-II

AuraGain: 30 adults

i-gel: 30 adults

A standardized general anaesthetic technique was used. 20mL of 0.002% methylene blue in isotonic saline was instilled into the oropharynx by oral and nasal routes (10ml each) with SAD bowl and laryngeal inlet under fiberscopic view. Incidence of dye leak into the bowl of SAD was rechecked fiberscopically.

Key Findings

1. There was no incident of either dye leak into the SAD bowl or dye stain in the gastric aspirate in any patient in both the groups.
2. Both i-gel (31.40 ± 4.99 cmH_2O) and AuraGain (31.33 ± 5.26 cmH_2O) achieved similar OLP (p=0.960).
3. When placed properly and tested for correct placement and performance, both AuraGain and i-gel are equally effective in protecting the upper airway.
4. This makes these devices potentially useful as primary airway rescue devices in patients with obtunded upper airway reflexes and blood and/or secretions in the oropharynx from oral or nasal routes.

References:

Deepak, P. G. *et al.* (2020) 'Evaluation of I-Gel, Ambu-AuraGain at low and high cuff-pressure for postoperative airway complications', *Trends in Anaesthesia and Critical Care*, 30, p. e32. doi: 10.1016/j.tacc.2019.12.082.

Sherif, M. J. *et al.* (2020) 'Ambu® AuraGain™ and I-gel™ as barriers to dye placed in the oropharynx- a preliminary study', *Trends in Anaesthesia and Critical Care*. Elsevier BV, 30, pp. e17–e18. doi: 10.1016/j.tacc.2019.12.046.

AuraGain vs. i-gel & Air-Q

The distance between the glottis and the cuff of a tracheal tube placed through three supraglottic airway devices (SAD) in children, a randomised controlled trial

Lee, J. H. et al. (2019). Eur J Anaesthesiol. 36: 721–727

2 level

Key Points

AuraGain: 29.0 ± 7.2 vs. i-gel: 27.9 ± 7.6 — Oropharyngeal leak pressure

AuraGain: 3 [3 to 4] vs. i-gel: 2 [2 to 2] — Fibreoptic view

AuraGain = less vocal cord damage — Safety margin

Study Overview

An RCT to compare AuraGain™, i-gel & Air-Q for:

- **Oropharyngeal leak pressure (OLP)**
- **Safety margin (SM)** = distance from SAD ventilation outlet to proximal cuff of trcheal tube (TT) - distance from ventilation outlet to vocal cord
- **Fibreoptic view* (FB)**

Methods

The study comprised of: 88 children <7 years old, undergoing elective surgery with ASA physical status of I-III

AuraGain: 29 patients; size 1.5 (n=9), size 2 (n=10), size 2.5 (n=10)

Air-Q: 29 patients; size 1 (n=9), size 1.5 (n=10), size 2 (n=10)

i-gel: 30 patients; size 1.5 (n=10), size 2 (n=10), size 2.5 (n=10)

Key Findings

1. The OLP (cmH_2O) measured immediately after insertion & 10 minutes post insertion were comparable between AuraGain & i-gel; Air-Q demonstrated significantly lower OLP (Figure 1).
2. Safety margin was widest with Air-Q followed by AuraGain, while the i-gel had the narrowest safety margin with all size of TT.

	AuraGain	Air-Q	i-gel
SM with the largest TT (cm)	4.4 ± 0.7	7.9 ± 1.1	1.9 ± 1.1
SM with one size smaller TT (cm)	3.1 ± 0.8	5.8 ± 1.4	0.7 ± 1.4
SM with two size smaller TT (cm)	1.2 ± 0.6	4.4 ± 1.3	-0.7 ± 1.5

3. Compared to the AuraGain & Air-Q groups, the fibreoptic view score was worse in i-gel group [IQR] (Figure 2).

*scored using Okuda score (4: <1/3 view covered with epiglottis, 3: 1/3–2/3 view covered with epiglottis, 2: >2/3 view covered with epiglottis, 1: completely covered with epiglottis but having an adequate function)

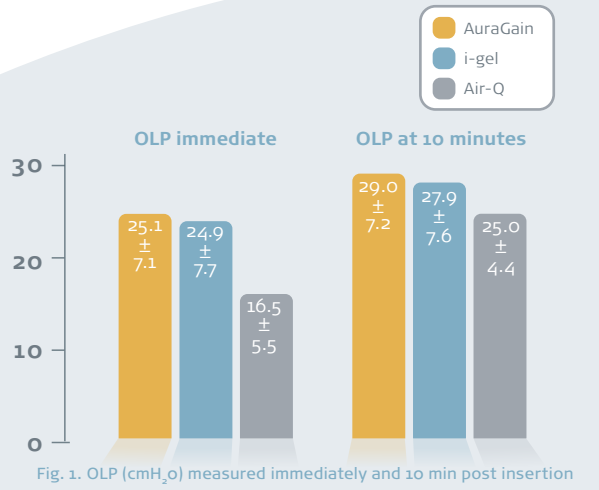

Fig. 1. OLP (cmH_2O) measured immediately and 10 min post insertion

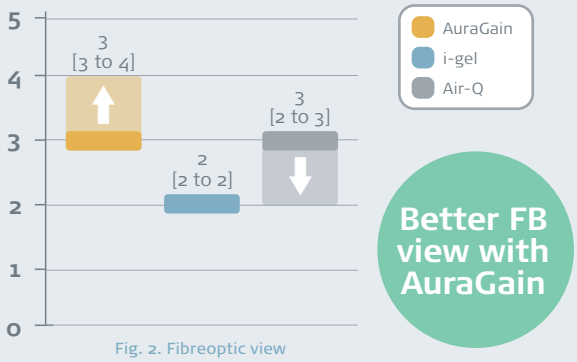

Fig. 2. Fibreoptic view

Conclusion

The OLP was the highest with AuraGain and cuffed TT can be safely located below vocal cords when AuraGain & Air-Q are used as intubation conduit. However, the possibility of vocal cord damage is higher when using the i-gel. Considering the shortest safety margin and the lowest fibreoptic view score, clinicians should be careful in using the i-gel as an intubating conduit in children.

Reference: Lee, J. H. *et al.* (2019) 'The distance between the glottis and the cuff of a tracheal tube placed through three supraglottic airway devices in children: A randomised controlled trial', *European Journal of Anaesthesiology*. Lippincott Williams and Wilkins, 36(10), pp. 721–727. doi: 10.1097/EJA.0000000000001070.

AuraGain vs. i-gel & Air-Q

Comparison of blind intubation with different supraglottic airway devices by inexperienced physicians in several airway scenarios: a manikin study

Bielski, A. et al. (2019). Eur J Pediatr. 178, pp. 871–882.

5 level

Study Overview

A cross-over assessment of AuraGain, i-gel and Air-Q on a paediatric manikin in three airway scenarios for:

- **First-attempt success rate**
- **Intubation success rate**
- **Time to SAD placement & blind intubation**

Methods

The study involved 116 non-anaesthetic and non-emergency physicians with no prior experience using SAD

Airway scenarios:

A - Normal airway without chest compression;
B - Normal airway with continuous chest compression;
C - Difficult airway with continuous chest compression

Key Findings

1. The first attempt success rate was the highest with the i-gel and the lowest with the Air-Q. The total intubation efficacy was 96.6% and 87.1% for Air-Q in scenario A and B respectively, while it was 100% for both the i-gel and AuraGain in both scenarios. The total intubation efficiency decreased for all the devices with scenario C, being: 89.7%, 86.2% and 81.9% for i-gel, AuraGain and Air-Q, respectively.
2. Time to the successful SAD placement and blind intubation was the shortest with the i-gel and the longest with the Air-Q. The difficulty of performing blind intubation increased from scenario A-C across all the devices; however, i-gel was rated to be the easiest and Air-Q the most difficult in all scenarios.
3. Both the i-gel and AuraGain were effective devices for blind intubation by inexperienced physicians in different paediatric airway scenarios.

AuraGain™ Evidence Compendium

AuraGain vs. ILTS-D & i-gel

Fibreoptic-guided and blind tracheal intubation through ILTS-D, Ambu® AuraGain™ and i-gel® supraglottic airway devices: a randomised crossover manikin trial

Somri, M. et al. (2019). J Emerg Med. pp. 1–9.

5 level

Study Overview

A cross-over assessment of AuraGain, i-gel and intubating laryngeal tube suction-disposal (iLTS-D) for:

- **Total time to intubation through SAD**
- **Total time for blind intubation**
- **Laryngeal view & manoeuvres**

Methods

The study comprised of 30 residents, with no prior experience using any of the devices.

Training was provided just before the study until they all achieved satisfactory performance.

Size: size 4 tested for all devices

Key Findings

1. The total time to fibreoptic tracheal intubation using the i-gel, AuraGain and iLTS-D was 42s, 56s, and 56s, respectively. The total time for blind tracheal intubation through the i-gel and the iLTS-D were 29s and 40s, respectively.
2. Laryngeal view grades were significantly poorer with the iLTS-D compared to the other devices. The iLTS-D required significantly more manoeuvres to achieve successful tracheal intubation.
3. In an airway manikin, the iLTS-D, AuraGain and i-gel appear to be reliable devices for airway rescue and fibreoptic-guided tracheal intubation.

References:

Bielski, A. *et al.* (2019) 'Comparison of blind intubation with different supraglottic airway devices by inexperienced physicians in several airway scenarios: a manikin study', *European Journal of Pediatrics*. Springer Verlag, 178, pp. 871–882. doi: 10.1007/s00431-019-03345-4.

Somri, M. *et al.* (2019) 'Fiberoptic-Guided and Blind Tracheal Intubation Through iLTS-D, Ambu® Auragain™, and I-Gel® Supraglottic Airway Devices: A Randomized Crossover Manikin Trial', *Journal of Emergency Medicine*. Elsevier USA, pp. 1–9. doi: 10.1016/j.jemermed.2019.09.045.

AuraGain vs. i-gel & ETT

Ambu® AuraGain™ and i-gel® laryngeal masks in general anaesthesia for laparoscopic cholecystectomy: performance characteristics and effects on hemodynamic

Sabuncu, U. et al. (2018). Saudi Med J. 39(11), pp. 1082–1089.

2 level

Key Points

AuraGain: 15 vs. i-gel 13 — SAD insertion time (seconds av.)

AuraGain: 100% vs. i-gel 100% — Success rate

AuraGain: 24.92 ± 3.56 vs. i-gel 26.72 ± 4.20 — Oropharyngeal leak pressure

Study Overview

An RCT to compare AuraGain™, i-gel & ETT for:

- **Time to SAD insertion (seconds)**
- **Time to ETT insertion (seconds)**
- **Oropharyngeal leak pressure (OLP)**
- **Ease of device insertion**
- **Times of insertion attempts**
- **First-attempt success rate**

Methods

The study comprised of: 105 patients, mean age 45, undergoing elective surgery with ASA physical status of I-II

AuraGain: 38 patients;

i-gel: 35 patients;

Endotracheal tube (ETT): 32 patients;

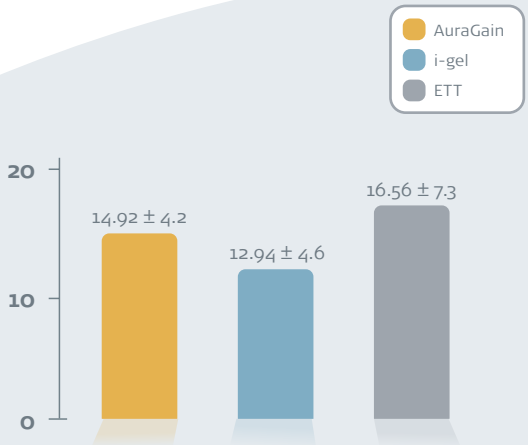

Fig. 1. Time to SAD & ETT insertion (Seconds)

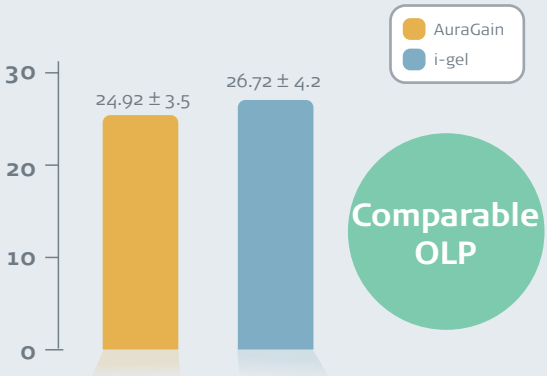

Fig. 2. OLP (cmH_2O) measured 5 mins post-insertion

Key Findings

1. Time to SAD insertion was comparable between AuraGain & i-gel groups, while ETT insertion took longer (Figure 1).
2. The OLP (cmH_2O) measured 5 minutes after insertion was comparable between AuraGain & i-gel groups (Figure 2).
3. Ease of device insertion was also reported:
   Straightforward = AuraGain 50% vs. i-gel 77.1% vs. ETT 50%
   Slightly difficult = AuraGain 50% vs. i-gel 22.8% vs. ETT 50%
4. Average times of device insertion attempts were comparable between groups:
   AuraGain = 1.05 ± 0.23
   i-gel = 1.09 ± 0.28
   ETT = 1.09 ± 0.39
5. The first-attempt success rate was 100% for AuraGain vs. 100% for i-gel vs. 96.9% for ETT.

Conclusion

Both AuraGain and i-gel® SADs performed better, compared to endotracheal tube regarding ease of device insertion, first attempt success rates, OLPs and perioperative complications. The time required for device insertion was comparable between AuraGain & i-gel. Favourable hemodynamic responses to AuraGain and i-gel® SADs may mean that they are superior to ETT.

Reference: Sabuncu, U. *et al.* (2018) 'Auragain™ and i-gel® laryngeal masks in general anesthesia for laparoscopic cholecystectomy: Performance characteristics and effects on hemodynamics', *Saudi Medical Journal*. Saudi Arabian Armed Forces Hospital, 39(11), pp. 1082–1089. doi: 10.15537/smj. 2018.11.22346.r

AuraGain vs. i-gel & ETT

A comparative study on intraocular pressure changes on insertion of endotracheal tube, Ambu® AuraGain™ and i-gel® in paediatric patients in non-ocular surgeries

Dwivedi, P. et al. (2017). J Evol Med Dent Sci. 6 (75).

2 level

Study Overview

An RCT to compare AuraGain, i-gel and ETT for:

- **Changes in intraocular pressure (IOP, mmHg) during and after insertion**

Methods

The study comprised of 45 paediatric patients (aged 1-12 years), undergoing elective non-ocular surgeries with ASA physical status of I-II

AuraGain: 15 patients

i-gel: 15 patients

Endotracheal tube: 15 patients

Key Findings

1. Both AuraGain and i-gel insertion caused lesser percentage increase in IOPs (10.69% and i-gel 3.73% respectively) compared to endotracheal intubation (42.26% increase in IOP, p <0.001).
2. Both AuraGain and i-gel provided stable IOPs prior to their removal unlike endotracheal extubation.
3. AuraGain and i-gel are better alternatives to endotracheal tubes for securing airway in paediatric patients under general anaesthesia as far as stability of IOP is concerned.

AuraGain™ Evidence Compendium

AuraGain vs. LMA Supreme & i-gel

Cross-over assessment of the Ambu® AuraGain™, LMA Supreme New Cuff and Intersurgical i-gel in fresh cadavers

Lopez, A. M. et al. (2014). Open J Anesthesiol. 4: pp. 332–339.

5 level

Study Overview

A cross-over assessment of AuraGain, i-gel and LMA Supreme New Cuff for:

- **Ease of insertion**
- **Seal pressure & efficiency of gastric access**
- **Capability as a conduit for direct optical intubation & extubation**
- **Anatomical position**

Methods

The study comprised of 7 fresh cadavers without difficult airway criteria.

Sizes (3/4/5): AuraGain (3/2/2), i-gel (3/2/2), LMA Supreme (3/2/2)

Gastric tube size: AuraGain and LMA Supreme (Size 16), i-gel (size 14/12)

Key Findings

1. The performance of the AuraGain is in line with that of the i-gel or LMA Supreme with respect to ease of insertion, seal pressure, anatomic position, the efficacy of gastric access and capability to serve as an intubating conduit.
2. In AuraGain group, the passage of the gastric tube along the oesophagus was as easy and fast as with the LMA Supreme in all, and all masks sizes tested; whereas the gastric channel of the i-gel accommodates a maximum 14 G tube through sizes 4 and 5, and 12 G through the size 3, resulting in difficulty in advancing the gastric tube in some cases.
3. Combination of these features in a single device (AuraGain) offers a promising alternative for airway management in challenging patients and advanced indications.

References:

Dwivedi, P. *et al.* (2017) 'A COMPARATIVE STUDY ON INTRAOCULAR PRESSURE CHANGES ON INSERTION OF ENDOTRACHEAL TUBE, AMBU AURAGAIN AND I-GEL IN PAEDIATRIC PATIENTS IN NON-OCULAR SURGERIES', J. *Evolution Med. Dent.* Sci, 6(75). doi: 10.14260/Jemds/2017/1166.

Lopez, A. M. *et al.* (2014) 'Cross-Over Assessment of the Am-buAuraGain, LMA Supreme New Cuff and Intersurgical I-Gel in Fresh Cadavers', *Open Journal of Anesthesiology*, 4, pp. 332–339. doi: 10.4236/ojanes.2014.412047.

AuraGain vs. Air-Q

A randomised comparison of the Air-Q® intubating laryngeal airway and Ambu® AuraGain™ laryngeal mask for controlled ventilation in children

Said, N. M. et al. (2018). Anaesthesia, pain & intensive care. 22 (4).

2 level

Key Points

- **AuraGain: 12** vs. Air-Q 12 — SAD insertion time (av.)
- **AuraGain: 17.6 ± 1.5** vs. Air-Q 19.4 ± 1.2 — Oropharyngeal leak pressure
- **AuraGain = better FB view** — Fibreoptic view

Study Overview

An RCT to compare AuraGain™ & Air-Q for:

- **Time to device insertion (seconds)**
- **Oropharyngeal leak pressure (OLP)**
- **First-attempt success rate**
- **Fibreoptic view* (FB)**
- **Ease of SAD insertion**
- **Airway quality during placement & maintenance of anaesthesia**

Methods

The study comprised of: 64 children (age 1-6 years) undergoing elective surgery with ASA physical status of I-II

AuraGain: 32 patients;

Air-Q: 32 patients;

Key Findings

1. Device insertion time was comparable between groups (Figure 1).
2. OLP was comparable between groups (Figure 2).
3. First-attempt SAD insertion success rate was 100% for both groups.
4. Fibreoptic view of the larynx was also comparable between groups:

Fibreoptic view score (%)	1	2	3	4	5
AuraGain	21.9	37.5	21.9	6.3	12.5
Air-Q	37.5	12.5	18.8	25	6.3

5. The ease of SGA insertion was comparable between groups.
6. Airway quality during device placement & maintenance of anaesthesia was also reported:

   Clear = AuraGain 93.8% vs. Air-Q 90.6%
   Partial obstruction = AuraGain 6.3% vs. Air-Q 9.4%

*Fiberoptic grade (1= only larynx was seen, 2= larynx and epiglottis posterior surface seen, 3= larynx and epiglottis tip of anterior surface seen, 4= epiglottis downfolded and its anterior surface seen and 5= epiglottis downfolded and larynx cannot be seen directly)

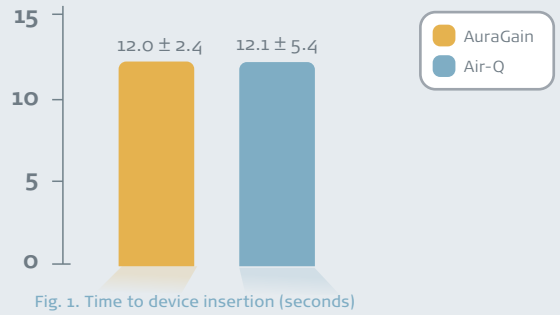

Fig. 1. Time to device insertion (seconds)

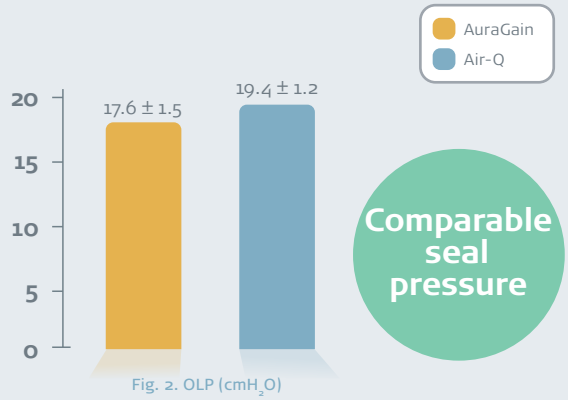

Fig. 2. OLP (cmH_2O)

Comparable seal pressure

Conclusion

OLP, time for successful insertion, the first attempt success rate, ease of insertion, quality of airway during placement and maintenance of anaesthesia, hemodynamic parameters and complications were comparable for both devices. Two patients in the air-Q® group required additional airway manoeuvres vs. none in the AuraGain group.

Reference: Said, N. M. *et al.* (2018) 'A randomized comparison the of the Air-Q® intubating laryngeal airway and Ambu® AuraGain™ laryngeal mask for controlled ventilation in children Nirawanti', *ANAESTHESIA, PAIN & INTENSIVE CARE*, 22(4).

AuraGain vs. Air-Q

Comparison of Ambu® AuraGain™ laryngeal mask and Air-Q™ intubating laryngeal airway for blind tracheal intubation in adults: a randomised controlled trial

Sethi, S. et al. (2017). Egypt J Anaesth. 33: 137–140.

2 level

Key Points

- **AuraGain: 13** vs. Air-Q 14 — SAD insertion time (av.)
- **AuraGain: 84%** vs. Air-Q 77.7% — SAD insertion (easy)
- **AuraGain = Good FB view** — Fibreoptic view

Study Overview

An RCT to compare AuraGain & Air-Q for:

- **Median time to device insertion (seconds)**
- **Median time to ETT intubation (seconds)**
- **First-attempt intubation success rate**
- **Overall blind intubation success rate**
- **Fibreoptic view* (FB)**
- **Ease of SAD insertion**

Methods

The study comprised of: 90 patients (mean age 32.5) undergoing elective surgery with ASA physical status of I-II

AuraGain: 45 patients; size 3 (n=39), size 4 (n=6)

Air-Q: 45 patients; size 3.5 (n=37), size 4.5 (n=8)

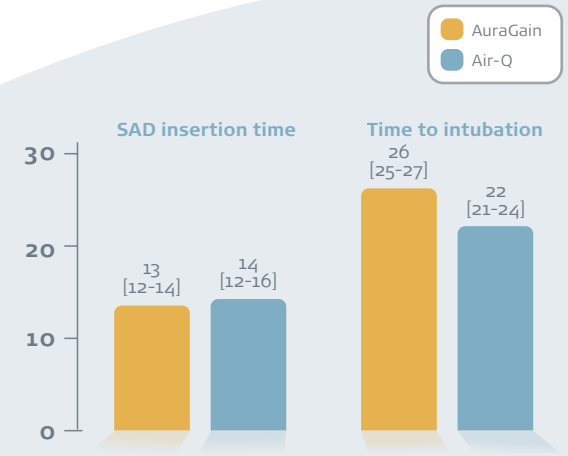

Fig. 1. Time to device insertion & intubation (seconds, median [IQR])

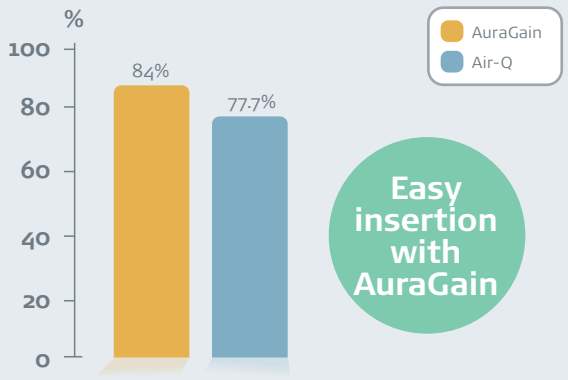

Fig. 2. Ease of SAD insertion

Key Findings

1. Device insertion time was comparable, while intubation time was slightly longer for AuraGain (Figure 1).
2. First-attempt intubation rate was higher in Air-Q (31/45) vs. AuraGain (16/45) group.
3. Overall blind intubation success rate was higher in Air-Q (36/45) vs. AuraGain (24/45) group.
4. The FB (laryngeal alignment) was comparable between groups:

FB score (number)	4	3	2	1	0
AuraGain	14	14	11	6	0
Air-Q	24	14	4	3	0

5. Ease of SAD insertion was also reported:

   Easy = AuraGain 84% vs. Air-Q 77.7%
   Acceptable = AuraGain 16% vs. Air-Q 22.3%

*Fibreoptic view: (grade 4 – only vocal cords seen; grade 3 – vocal cords and epiglottis seen; grade 2 – only epiglottis seen; grade 1 epiglottis not seen; and grade 0 - failed passage of fibreoptic scope or failed insertion of airway device)

Conclusion

The SAD insertion time, ease of insertion, FB view & success rate were comparable between the AuraGain & the Air-Q groups. The time needed for blind endotracheal intubation and the overall success rate were in favour of Air-Q. The superiority of Air-Q over AuraGain regarding the blind endotracheal intubation requires further investigation.

Reference: Sethi, S. *et al.* (2017) 'Comparison of Ambu® AuraGain™ laryngeal mask and Air-Q™ intubating laryngeal airway for blind tracheal intubation in adults: A randomized controlled trial', *Egyptian Journal of Anaesthesia*. Central Society of Egyptian Anaesthesiologists, 33(2), pp. 137–140. doi: 10.1016/j.egja.2017.03.002.

AuraGain vs. LMA ProSeal

Comparison of Ambu® AuraGain™ and LMA® ProSeal in children under controlled ventilation

Joshi, R. et al. (2018). Indian J Anaesth. 62: 455–460.

2 level

Key Points

AuraGain: 12 vs. ProSeal 20 — SAD insertion time (median)

AuraGain: 98% vs. ProSeal 83% — Gastric tube insertion (easy)

AuraGain: 23.3 ± 4.6 vs. ProSeal 20.6 ± 4.8 — Oropharyngeal seal pressure

Study Overview

An RCT to compare AuraGain™ & LMA ProSeal for:

- **Median time to device insertion (seconds)**
- **Oropharyngeal seal pressure (OSP)**
- **First-attempt success rate**
- **Fibreoptic view* (FB)**
- **Ease of SAD & gastric tube insertion**

Methods

The study comprised of: 94 children (age 6 months-12 years) undergoing elective surgery with ASA physical status of I-II

AuraGain: 47 patients; size 1.5 (n=13), size 2 (n=31), size 2.5 (n=3)

LMA ProSeal: 47 patients; size 1.5 (n=10), size 2 (n=30), size 2.5 (n=7)

Key Findings

1. AuraGain demonstrated significantly shorter device insertion time (Figure 1).
2. AuraGain demonstrated significantly higher OSP (Figure 2).
3. First-attempt SAD insertion success rate was 95.7% for both groups.
4. Fibreoptic view of the larynx was also comparable between groups:

Fibreoptic view score (%)	1	2	3	4
AuraGain	0	40	49	11
LMA ProSeal	2	32	60	6

5. The ease of SGA & gastric tube insertion were reported
   - **Ease of SGA insertion:**
     No resistance = AuraGain 72% vs. LMA ProSeal 80%
     Mild resistance = AuraGain 23% vs. LMA ProSeal 17%
     Moderate resistance = AuraGain 4% vs. LMA ProSeal 2%
   - **Ease of gastric tube insertion:**
     Easy = AuraGain 98% vs. LMA ProSeal 83%
     Difficult = AuraGain 2% vs. LMA ProSeal 17%

*Brimacombe score: 1-vocal cords not seen, 2-vocal cords plus anterior epiglottis seen, 3-vocal cords plus posterior epiglottis seen, and 4-only vocal cords visible.

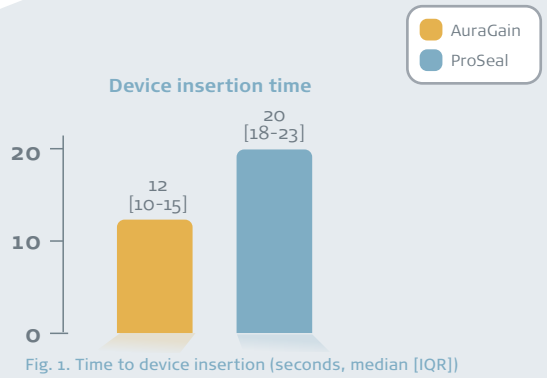

Fig. 1. Time to device insertion (seconds, median [IQR])

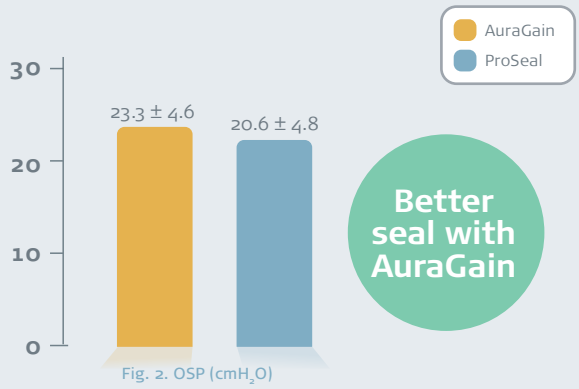

Fig. 2. OSP (cmH_2O)

Conclusion

SAD insertion success rate, ease of insertion and fibreoptic view were comparable between groups. Ambu AuraGain™ provided a significantly better OSP, a shorter insertion time, and an easier gastric tube insertion compared to LMA ProSeal® and can be considered as an option to LMA ProSeal® in children for controlled ventilation.

Reference: Joshi, R. *et al.* (2018) 'Comparision of Ambu® AuraGain™ and LMA® ProSeal in children under controlled ventilation', *Indian Journal of Anaesthesia*. Indian Society of Anaesthetists, 62(6), pp. 455–460. doi: 10.4103/ija.IJA_86_18.

AuraGain vs. LMA ProSeal

Comparative evaluation of Ambu® AuraGain™ with ProSeal™ laryngeal mask airway in patients undergoing laparoscopic cholecystectomy

Singh, K. and Gurha, P. (2017). Indian J Anaesth. 61: 469–474.

2 level

Key Points

- **AuraGain: 28.8 ± 4.8** vs. ProSeal 27.2 ± 16.9 — Oropharyngeal leak pressure
- **AuraGain: 13** vs. ProSeal 11 — SAD insertion time (av.)
- **AuraGain = larger tube passage** — Gastric tube passage

Study Overview

An RCT to compare AuraGain & LMA ProSeal for:

- **Initial & post insufflation Peak Airway Pressure (PAP)**
- **Oropharyngeal leak pressure (OLP)**
- **Time to device insertion (seconds)**
- **First-attempt success rate**
- **Ease of SAD insertion**
- **Passage of gastric tube**

Methods

The study comprised of: 60 patients (age 37-43 years) undergoing laparoscopic surgery with ASA physical status of I-II

AuraGain: 30 patients; size 3 (n=4), size 4 (n=17), size 5= (n=9)

LMA ProSeal: 30 patients; size 3 (n=3), size 4 (n=19), size 5 (n=8)

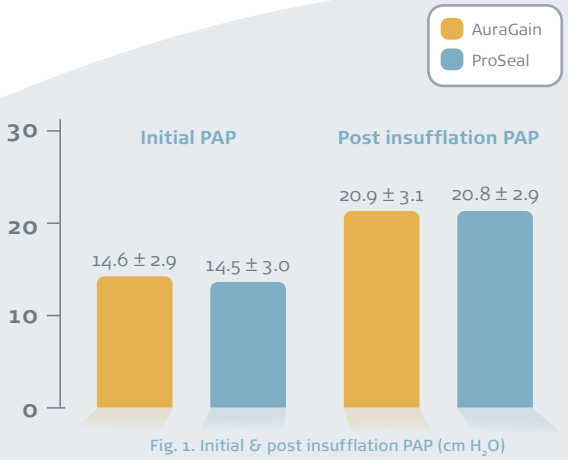

Fig. 1. Initial & post insufflation PAP (cm H_2O)

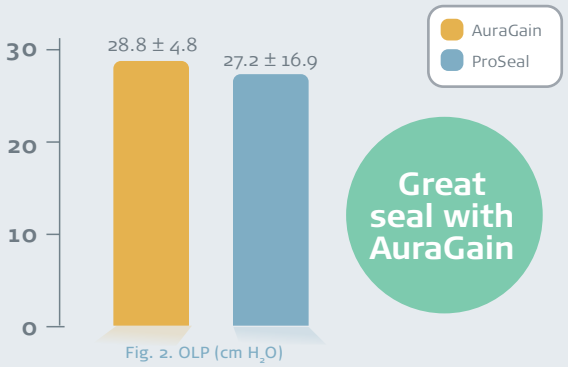

Fig. 2. OLP (cm H_2O)

Great seal with AuraGain

Key Findings

1. The initial & post insufflation PAP were comparable between groups (Figure 1).
2. AuraGain provided slightly higher OLP vs. LMA ProSeal (Figure 2).
3. SAD insertion time was comparable between AuraGain (13.57 ± 1.94) and LMA ProSeal (11.60 ± 2.22).
4. First-attempt success rate was 60% for AuraGain vs. 80% for LMA ProSeal; both devices achieved 100% success rate on second attempt.
5. The ease of SGA insertion was reported:
   Easy = AuraGain 60% vs. LMA ProSeal 73%
   Difficult = AuraGain 40% vs. LMA ProSeal 27%
6. AuraGain allowed the passage of larger gastric tube:
   - Gastric tube size (14/16Fr)
     AuraGain = 9/21
     LMA ProSeal = 30/0

Conclusion

The OLP of both AuraGain and ProSeal was higher than the peak airway pressure and was sufficient to prevent aspiration while ventilating the study patients during carboperitoneum. First attempt success rate & ease of insertion were comparable between groups. AuraGain however, allowed the passage of a larger bore gastric tube, making it favourable in situations where a larger tube may help in better gastric decompression.

Reference: Singh, K. and Gurha, P. (2017) 'Comparative evaluation of Ambu® AuraGain™ with ProSeal™ laryngeal mask airway in patients undergoing laparoscopic cholecystectomy', Indian Journal of Anaesthesia. Indian Society of Anaesthetists, 61(6), pp. 469–474. doi: 10.4103/ija.IJA_163_17.

AuraGain vs. LMA ProSeal

A prospective, observational study of clinical efficacy of two second generation laryngeal mask airways at tertiary care centre, in patients posted for elective surgeries

Shankar, G., Pethkar, T. and Keerthana, N. (2020). Int J Sci Res; 9 (1).

2 level

Key Points

AuraGain: 25.4 ± 1.8 vs. ProSeal 23.9 ± 1.9
Oropharyngeal leak pressure

AuraGain: 20 vs. ProSeal 17
SAD insertion time (av.)

AuraGain = good passage
Gastric tube passage

Study Overview

An observational study to evaluate AuraGain & LMA ProSeal for:

- **Oropharyngeal leak pressure (OLP)**
- **Time to successful SAD insertion (seconds)**
- **First-attempt success rate**
- **Ease of SAD insertion**
- **Ease of gastric tube insertion**

Methods

The study comprised of: 120 patients (mean age 37 years) undergoing elective surgery with ASA physical status of I-II

AuraGain: 60 patients;

LMA ProSeal: 60 patients;

Key Findings

1. AuraGain demonstrated significantly higher OLP (Figure 1).
2. Time to successful SAD insertion was shorter in LMA ProSeal than AuraGain group (Figure 2).
3. First-attempt success rate was 88.3% for AuraGain vs. 96.7% for LMA ProSeal; both devices achieved 100%success rate on second attempt.
4. The ease of SGA was reported:

   No resistance = AuraGain 38.3% vs. LMA ProSeal 80%
   Mild resistance = AuraGain 35% vs. LMA ProSeal 20%
   Moderate resistance = AuraGain 26.7%
5. There was no difference in passing gastric tube between groups.

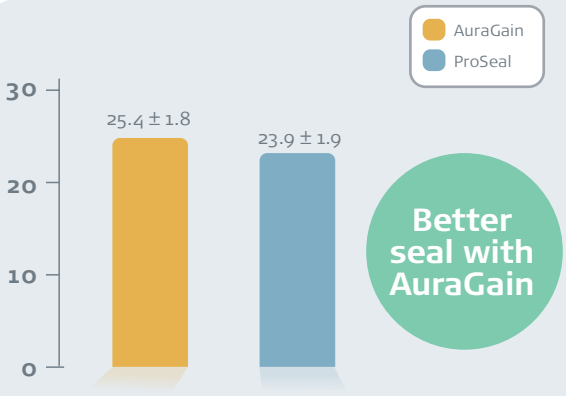

Fig. 1. OLP (cm H_2O) measured 5 mins post-insertion

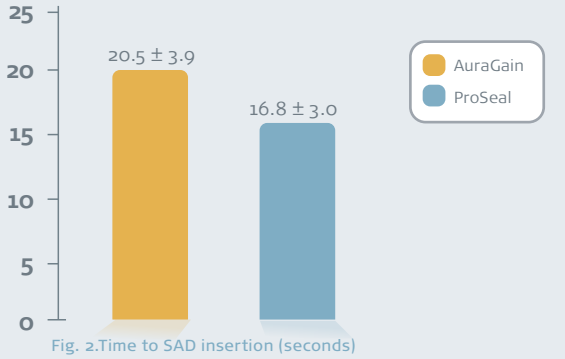

Fig. 2.Time to SAD insertion (seconds)

Conclusion

AuraGain provided better OLP. The first and overall SAD insertion success rates were comparable between the groups, however, LMA Proseal was more often rated as easy to insert compared to AuraGain. Airway trauma was minimal and similar in both groups. Both Ambu AuraGain and LMA Proseal can be used safely and effectively in selected patients undergoing general anaesthesia.

Reference: Shankar, G., Pethkar, T. and Keerthana, N. (2020) 'A prospective observational study of clinical efficacy of two second generation laryngeal mask airways at tertiary care centre in patients posted for elective surgeries', *International journal of scientific research*, 9(1). doi: 10.36106/ijsr.

AuraGain vs. LMA Fastrach

A randomised controlled trial comparing fibreoptic-guided tracheal intubation through two supraglottic devices: Ambu® AuraGain™ laryngeal mask and LMA® Fastrach™

Preece, G. et al. (2018). Anaesth Intensive Care. 46: 474–479.

2 level

Key Points

AuraGain: 37 vs. Fastrach 44 — SAD insertion time (median)

AuraGain: 69 vs. Fastrach 90 — Intubation time (median)

AuraGain: 100% vs. Fastrach 84% — ETT Success rate

Study Overview

An RCT to compare AuraGain™ & LMA Fastrach for:

- **Median time to device insertion (seconds)**
- **Median time to ETT intubation (seconds)**
- **SAD insertion success rate**
- **ETT insertion success rate**
- **Ease of ETT insertion**
- **Fibreoptic view* (FB)**
- **Postoperative complications**

Methods

The study comprised of: 116 patients (age 54-56) undergoing elective surgery with ASA physical status of I-III

AuraGain: 59 patients; size 3 (n=15), size 4 (n=35), size 5 (n=9)

LMA Fastrach: 57 patients; size 3 (n=5), size 4 (n=36), size 5 (n=16)

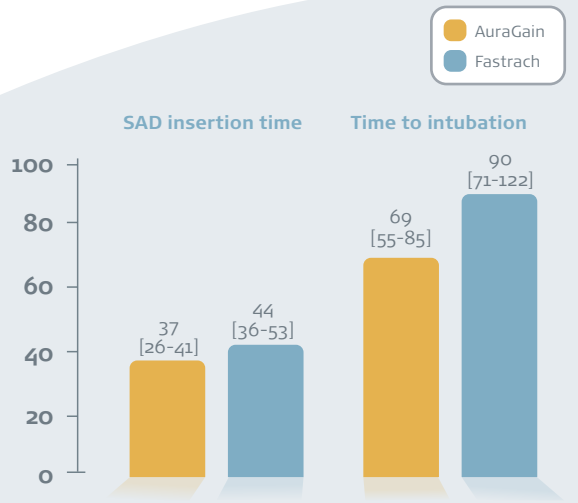

Fig. 1. Time to device insertion & intubation (seconds, median [IQR])

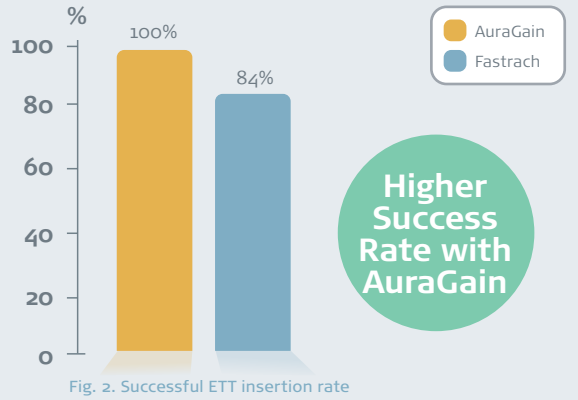

Fig. 2. Successful ETT insertion rate

Key Findings

1. AuraGain demonstrated significantly shorter device insertion time & intubation time compared to LMA Fastrach (Figure 1).
2. SAD insertion success rate was slightly higher in AuraGain (100%) vs. LMA Fastrach (95%) group.
3. AuraGain provided higher ETT insertion success rate vs. LMA Fastrach (Figure 2).
4. It was easier to insert ETT through AuraGain (9/10) than LMA Fastrach (7/10).
5. The fibreoptic view (laryngeal alignment) was superior in the AuraGain group compared to the LMA Fastrach group.

Fibreoptic view score (%)	1	2	3	4
AuraGain	4	32	15	49
LMA F	20	15	28	37

6. Postoperative dysphonia & dysphagia were higher in LMA Fastrach (28% & 9%) vs. AuraGain (20% & 4%).

* Brimacombe and Berry scoring system: 1-vocal cords not visible, 2-vocal cords plus anterior epiglottis visible, 3-vocal cords plus posterior epiglottis visible, and 4-only vocal cords visible.

Conclusion

Ambu AuraGain was found to be superior to the Fastrach LMA as it provided better laryngeal alignment and quicker insertion time. AuraGain also allowed quicker and easier ETT intubation when used as a conduit. The SAD & ETT insertion success rates were also in favour of AuraGain. The postoperative complication rate was comparable between devices.

Reference: Preece, G. *et al.* (2018) 'A randomised controlled trial comparing fibreoptic-guided tracheal intubation through two supraglottic devices: Ambu® AuraGain™ laryngeal mask and LMA® Fastrach™', *Anaesthesia and intensive care*. NLM (Medline), 46(5), pp. 474–479. doi: 10.1177/0310057x1804600508.

AuraGain vs. LMA Fastrach

Blind tracheal intubation through two supraglottic devices: the Ambu® AuraGain™ vs the LMA Fastrach

Correa, T. L. et al. (2016). Emergencias. 28: 83–88.

2 level

Study Overview

An RCT to compare AuraGain and LMA Fastrach for:

- **Blind intubation success rate**
- **Fibreoptic view**

Methods

The study comprised of 80 patients (average age: 53.5 years) undergoing elective surgery with ASA status of I-III

AuraGain: 40 patients

LMA Fastrach: 40 patients

Key Findings

1. Adequate ventilation was achieved with both devices; in 92.5% in the AuraGain group and 95% in the LMA group.
2. The AuraGain provided a better view of the glottis on all attempts (p<0.001). However, The rate of blind intubation success was higher with the LMA (70%) than with the AuraGain (17.5%) (p<.001).
3. Even though the two devices are similarly effective, blind intubation was superior with the LMA Fastrach mask.

AuraGain™ Evidence Compendium

AuraGain vs. LMA Fastrach

Success of blind tracheal intubation using the Ambu® AuraGain™ laryngeal airway compared with the intubating laryngeal mask airway (LMA Fastrach) by novice users: a manikin study

Zhang, J. et al. (2018). Trends Anaesth Crit Care. 21: 47–52.

5 level

Study Overview

A crossover evaluation of AuraGain and LMA Fastrach for:

- **Intubation success rate**
- **Time to intubation**
- **SGA insertion time**

Methods

The study comprised of 38 anaesthesia specialists and residents (27-35 years) with no or limited experience (performed <5 SGA intubations)

AuraGain size 3; 6.5 mm tracheal tube

LMA Fastrach: size 3; 7.0 mm tracheal tube

Key Findings

1. The overall success rate of blind intubation was 86.8% (33/38) for the AuraGain and 97.4% (37/38) for the LMA Fastrach and there was no statistical significance between the two devices (p=0.0888).
2. There was no significant difference between time to SGA insertion and intubation using the AuraGain and the LMA Fastrach.
3. Further clinical studies are required to evaluate blind intubation through the AuraGain.

References:

Correa, T. L., Sastre, J. A. and Garzón, J. C. (2016) '[Blind tracheal intubation through 2 supraglottic devices: the Ambu AuraGain vs the LMA Fastrach].', *Emergencias*, 28(2), pp. 83–88. Available at: http://www.ncbi.nlm.nih.gov/pubmed/29105428 (Accessed: 17 December 2019).

Zhang, J. *et al.* (2018) 'Success of blind tracheal intubation using the Auragain laryngeal airway compared with the Intubating Laryngeal Mask Airway (IMA Fastrach) by novice users: A manikin study', *Trends in Anaesthesia and Critical Care*. Churchill Livingstone, 21, pp. 47–52. doi: 10.1016/j.tacc.2018.05.004.

AuraGain vs. ILMA

A new second-generation supraglottic airway device (Ambu® AuraGain™) versus intubating laryngeal mask airway (ILMA) as conduits for blind intubation - A prospective, randomised trial

Sudheesh, K. et al. (2019). Indian J Anaesth. 63: 558–564.

2 level

Key Points

AuraGain: 93.3% vs. ILMA 95% — Success rate

AuraGain = better patient outcome — Postoperative complications

AuraGain: 62 vs. ILMA 55 — Intubation time (seconds av.)

Study Overview

An RCT to compare AuraGain™ & ILMA for:

- **First-attempt success rate**
- **Time to successful intubation (seconds)**
- **Blind intubation success rate**
- **Thyromental distance (cm)**
- **Cormak-Lehane grade**
- **Postoperative complications**

Methods

The study comprised of: 120 patients (age 18-60) undergoing elective surgery with ASA physical status of I-II

AuraGain: 60 patients; (size selected according to weight)

ILMA: 60 patients; (size selected according to weight)

Key Findings

1. First-attempt success rate was comparable between devices (Figure 1).
2. The average time to successful intubation was comparable between devices (Figure 2).
3. Blind intubation success rate was higher for ILMA (77.6%) than AuraGain (54.5%).
4. The thyromental distance was longer (7.62 ± 0.75) in successfully intubated group in ILMA patients vs. unsuccessful intubation (5.25 ± 0.35).
5. Thyromental distance did not influence the intubation success rate in AuraGain group; however, Cormack–Lehane grade 1 was associated with higher success rate than Cormack–Lehane grade 2.
6. Postoperative complication rates were comparable between groups:
   Hoarseness = AuraGain 13.3% vs. ILMA 16.7%
   Sore throat = AuraGain 18.3% vs. ILMA 23.3%
   Nausea & vomiting = AuraGain 3.3% vs. ILMA 1.7%
   Blood stain = AuraGain 10% vs. ILMA 8.3%

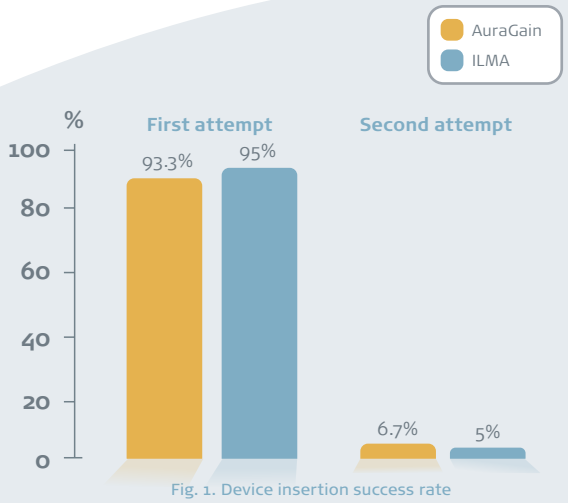

Fig. 1. Device insertion success rate

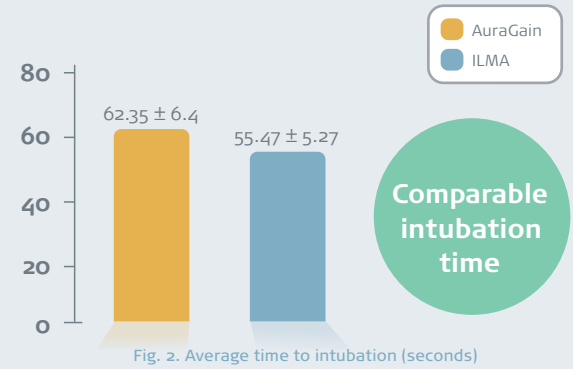

Fig. 2. Average time to intubation (seconds)

Conclusion

The device insertion success rate, intubation time and postoperative complications were comparable between devices. The blind intubation success rate was higher with ILMA. Thyromental distance & Cormack–Lehane grade influenced the overall success rate. However, the overall success rate for both devices were 100%. The Ambu AuraGain is comparable to intubating LMA for providing adequate ventilation.

Reference: Sudheesh, K. *et al.* (2019) 'A new second-generation supraglottic airway device (Ambu® AuraGain™) versus intubating laryngeal mask airway as conduits for blind intubation - A prospective, randomised trial', *Indian Journal of Anaesthesia*. Wolters Kluwer Medknow Publications, 63(7), pp. 558–564. doi: 10.4103/ija.IJA_269_19.

AuraGain vs. LMA protector

A prospective, randomised trial of the Ambu® AuraGain™ laryngeal mask versus the LMA® protector airway in paralysed, anesthetised adult men

Moser, B. et al. (2018). Minerva Anestesiol. 84: 684–692.

2 level

Key Points

AuraGain: 16 vs. Protector 19 — Intubation time (seconds av.)

AuraGain: 98% vs. Protector 74% — Success rate

AuraGain: 100% vs. Protector 68% — Gastric tube insertion (1st attempt)

Study Overview

An RCT to compare AuraGain™ & LMA protector for:

- **Time to device insertion (seconds)**
- **Time to successful intubation (seconds)**
- **Oropharyngeal leak pressure (OLP)**
- **First-attempt success rate for SAD & gastric tube**
- **Gastric content volume (mL)**
- **Ease of advancing tracheal tube**

Methods

The study comprised of: 93 male patients (age 45-48) undergoing elective surgery with ASA physical status of I-II

AuraGain: 46 patients; size 5

LMA Protector: 47 patients; size 5

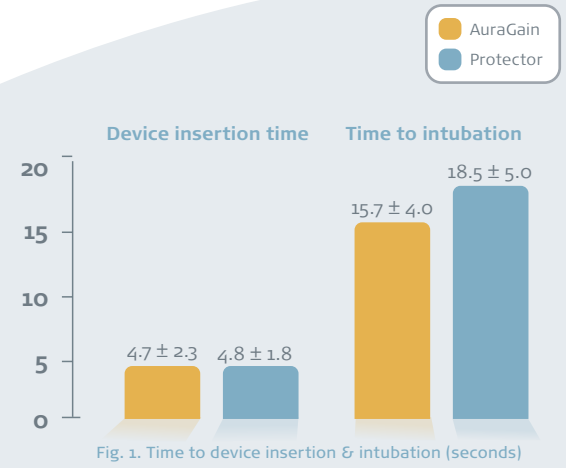

Fig. 1. Time to device insertion & intubation (seconds)

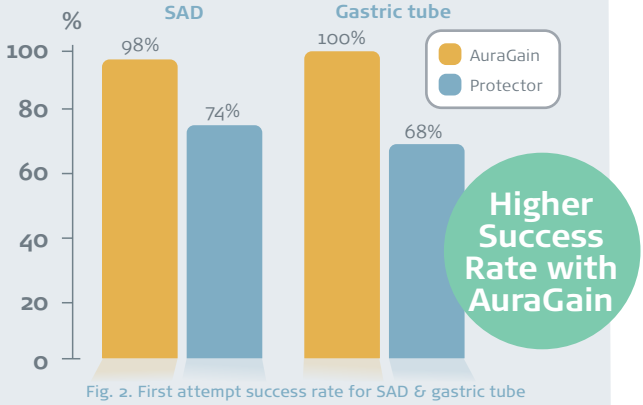

Fig. 2. First attempt success rate for SAD & gastric tube

Key Findings

1. AuraGain demonstrated shorter intubation time, while device insertion time was comparable between devices (Figure 1).
2. AuraGain demonstrated slightly higher OLP (30.1 ± 6.0, cmH_2O) vs. LMA protector (28.2 ± 6.7, cmH_2O).
3. AuraGain demonstrated significantly higher first-attempt SAD & gastric tube insertion success rates compared to LMA protector (Figure 2).
4. Gastric content volume was 5.7 ± 5.2 for AuraGain vs. 8.3 ± 7.8 for LMA protector.
5. Ease of advancing tracheal tube was also reported:

   Easy passage = AuraGain 87% vs. LMA 47%
   Little resistance= AuraGain 11% vs. LMA 26%
   Significant resistance= LMA 28%

Conclusion

Insertion success of laryngeal mask, gastric tube insertion, ease of advancing the tracheal tube and trans-device intubation time were in favour of AuraGain. OLP, SAD insertion time & gastric content volume were similar for both devices. Handling of the device as measured as first-time successful placement was significantly in favour of the AuraGain.

Reference: Moser, B. *et al.* (2018) 'A prospective, randomized trial of the Ambu AuraGainTM laryngeal mask versus the LMA® protector airway in paralyzed, anesthetized adult men', *Minerva anestesiologica*. NLM (Medline), 84(6), pp. 684–692. doi: 10.23736/S0375-9393.17.12254-6.

AuraGain vs. LMA Supreme

Comparison of oropharyngeal leak pressure between the Ambu® AuraGain™ and the LMA® Supreme™ supraglottic airways: a randomised-controlled trial

Wong, D. T. et al. (2018). Can J Anesth. 65: 797–805.

2 level

Key Points

AuraGain: 26.4 ± 2.8 vs. Supreme 21.6 ± 3.4 — Oropharyngeal leak pressure

AuraGain: 13 vs. Supreme 11 — SAD insertion time (av.)

AuraGain = great patient satisfaction — Satisfaction

Study Overview

An RCT to compare AuraGain & LMA Supreme for:

- **Oropharyngeal leak pressure (OLP)**
- **Time to device insertion (seconds)**
- **First-attempt success rate**
- **Ease of SAD insertion**
- **Patient & anaesthesiologist satisfaction**

Methods

The study comprised of: 165 patients (mean age 50 years) undergoing day surgery with ASA physical status of I-III

AuraGain: 81 patients; size 3 (n=10), size 4 (n=38), size 5= (n=33)

LMA Supreme: 84 patients; size 3 (n=2), size 4 (n=31), size 5 (n=51)

Key Findings

1. AuraGain demonstrated significantly higher OLP (Figure 1).
2. Time to successful SAD insertion was comparable between AuraGain (13 ± 4) and LMA Supreme (11 ± 3) group.
3. First-attempt success rate was 77% for AuraGain vs. 94% for LMA Supreme; both devices achieved 100% success rate overall.
4. The ease of SGA insertion was reported to be easy or fair in 86% of the cases in AuraGain vs. 100% in the LMA Supreme group. In 14% of the cases, there was difficulty in inserting AuraGain.
5. Overall patient satisfaction (2h post surgery) was comparable between AuraGain (95% either satisfied or extremely satisfied) vs. LMA Supreme (93%); Overall anaesthesiologists satisfaction was also comparable (AuraGain 93% either high or moderate vs. LMA Supreme 98%) (Figure 2).

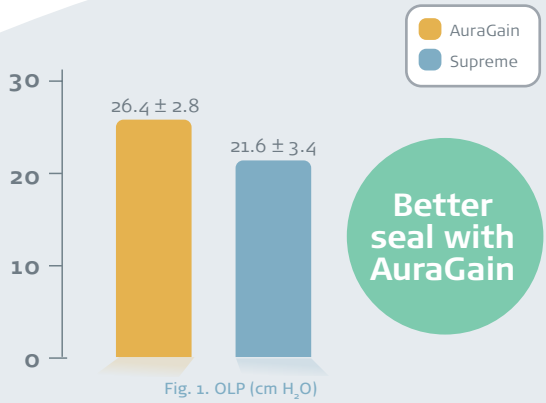

Fig. 1. OLP (cm H_2O)

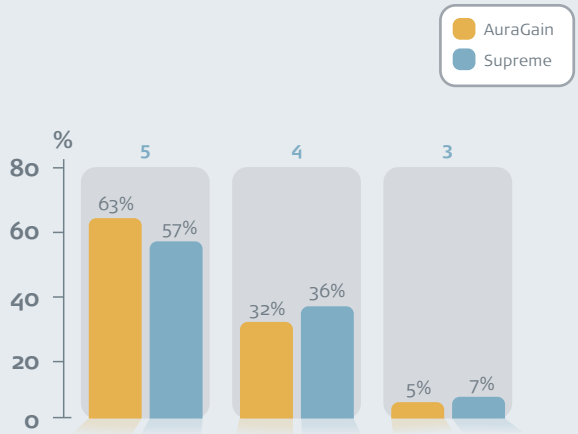

Fig. 2. Patient satisfaction
(0 = very dissatisfied, 5 = extremely satisfied)

Conclusion

AuraGain provided better OLP. A higher OLP may allow for SGAs to be utilized in a wider range of patients and procedures. Device insertion time was comparable between groups. The first attempt success rate & ease of SGA insertion were in favour of LMA Supreme. Overall patient & anaesthesiologists satisfaction were comparable between groups.

Reference: Wong, D. T. *et al.* (2018) 'Comparison of oropharyngeal leak pressure between the Ambu® AuraGain™ and the LMA® Supreme™ supraglottic airways: a randomized-controlled trial', *Canadian Journal of Anesthesia.* Springer New York LLC, 65(7), pp. 797–805. doi: 10.1007/s12630-018-1120-4.

AuraGain vs. LMA Supreme

Ambu® AuraGain™ versus LMA Supreme™ Second Seal™ : a randomised controlled trial comparing oropharyngeal leak pressure and gastric drain functionality in spontaneously breathing patients

Shariffuddin, I. I. et al. (2017). Anaesth Intensive Care. 45: 244–250.

2 level

Key Points

AuraGain: 24.1 ± 7.4 vs. LMA SSS 23.6 ± 6.2 — Oropharyngeal leak pressure

AuraGain: 76% vs. LMA SSS 61% — Gastric tube insertion (easy)

AuraGain = Less AM — Additional Manoeuvres (AM)

Study Overview

An RCT to compare AuraGain™ & LMA Supreme Second Seal (LMA SSS) for:

- **Oropharyngeal leak pressure (OLP)**
- **Time to device insertion (seconds)**
- **First-attempt success rate**
- **Ease of SAD insertion & additional manoeuvres (AM)**
- **Gastric tube insertion rate & ease of insertion**

Methods

The study comprised of: 100 patients (age 44-48 years) undergoing elective surgery with ASA physical status of I-III

AuraGain: 50 patients; size 3 (n=26), size 4 (n=24)

LMA SSS: 50 patients; size 3 (n=22), size 4 (n=28)

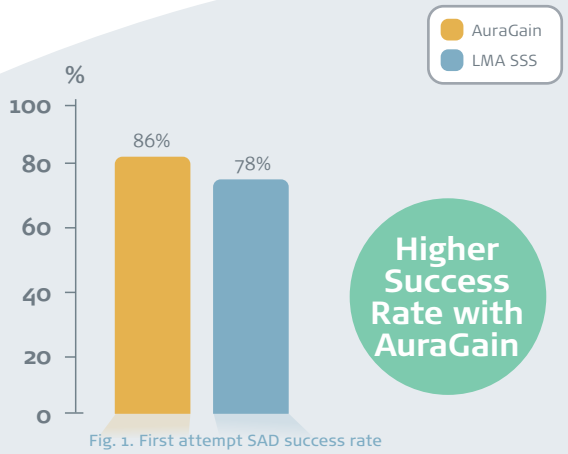

Fig. 1. First attempt SAD success rate

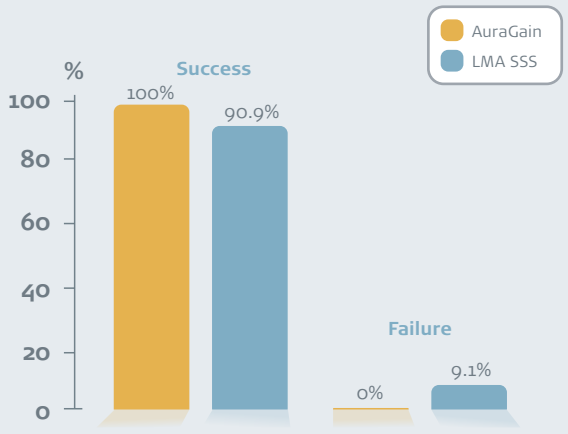

Fig. 2. Gastric tube insertion success rate

Key Findings

1. OLP (cmH_2O) was comparable between AuraGain (24.1 ± 7.4) & LMA SSS (23.6 ± 6.2) groups.
2. Time to successful SAD insertion was longer in AuraGain (33.4 ± 10.9) than LMA SSS (27.3 ± 11.4) group.
3. First-attempt success rate was 86% for AuraGain vs. 78% for LMA SSS; both devices achieved 100% success rate overall (Figure 1).
4. It was easier to insert LMA SSS, however, AuraGain required significantly less additional manoeuvres (28%) compared to LMA SSS (36%).
5. Gastric tube insertion success rate was in favour of AuraGain (Figure 2). The ease of gastric tube insertion was reported as:

   Easy = AuraGain 75.5% vs. LMA SSS 61.4%
   Acceptable = AuraGain 16.35 vs. LMA SSS 22.7%
   Difficult = AuraGain 8.2% vs. LMA SSS 15.9%

Conclusion

The OLP was comparable between groups. AuraGain took longer to insert, however, required significantly less AM. The first attempt success rate, gastric tube insertion success rate & easy of gastric tube insertion were in favour of AuraGain. In conclusion, this study has demonstrated satisfactory performance of the new AuraGain in spontaneously breathing anaesthetised adults.

Reference: Shariffuddin, I. I. *et al.* (2017) 'Ambu® AuraGain™ versus LMA Supreme™ Second Seal™: A randomised controlled trial comparing oropharyngeal leak pressures and gastric drain functionality in spontaneously breathing patients', *Anaesthesia and Intensive Care*. Australian Society of Anaesthetists, 45(2), pp. 244–250. doi: 10.1177/0310057x1704500215.

AuraGain vs. LMA Supreme

A randomised comparison of the Ambu® AuraGain™ versus the LMA Supreme in patients undergoing gynaecologic laparoscopic surgery

Lopez, A. M. et al. (2016). J Clin Monit Comput. 31(6) : 1255–1262.

2 level

Key Points

AuraGain: 34 ± 5 vs. Supreme 29 ± 5 — Seal pressure

AuraGain: 100% vs. Supreme 96.5% — Success rate

AuraGain: 13.2 vs. Supreme 11.5 — SAD insertion time (seconds av.)

Study Overview

An RCT to compare AuraGain & LMA Supreme new cuff for:

- **Initial seal pressure (ISP) & airway pressure**
- **Time to device insertion (seconds)**
- **First-attempt success rate**
- **Additional manoeuvres**
- **Fibreoptic view* (FB)**

Methods

The study comprised of: 60 females (age 39-42 years) undergoing laparoscopic surgery

AuraGain: 31 patients; SAD size 4; gastric tube (16G)

LMA Supreme: 29 patients; SAD size 4; gastric tube (16G)

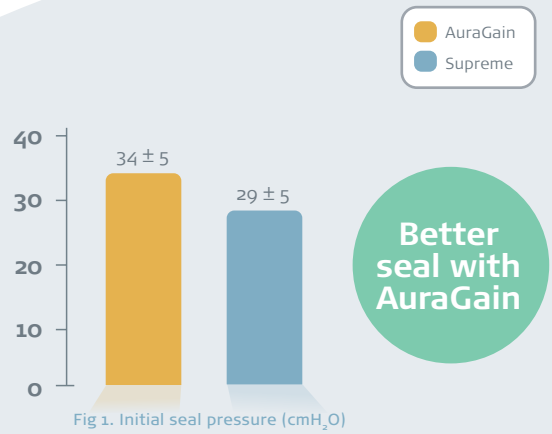

Fig 1. Initial seal pressure (cmH_2O)

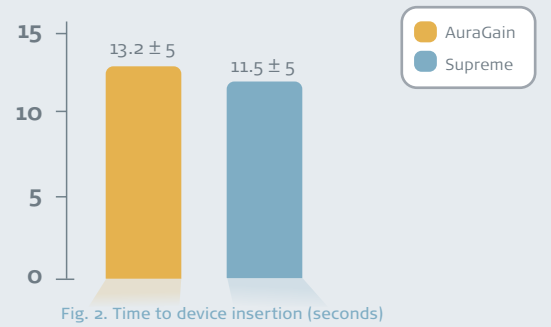

Fig. 2. Time to device insertion (seconds)

Key Findings

1. AuraGain demonstrated significantly higher ISP (Figure 1) & initial airway pressure (AuraGain 16 ± 3 vs. LMA Supreme 14 ± 2).
2. Time to successful SAD insertion was comparable between groups (Figure 2).
3. First-attempt success rate was 100% for AuraGain vs. 96.5% for LMA Supreme; both devices achieved 100% success rate overall.
4. Both devices required similar amount of additional manoeuvres.
5. The fibreoptic view (laryngeal alignment) was superior in the AuraGain group compared to the LMA Fastrach group:

FB score (numbers)	1	2	3
AuraGain	10	21	0
LMA Supreme	9	17	3

*Fibreoptic view: 1 = complete vocal cord, 2 = epiglottis seen inside the tube, 3 = obstructed view.

Conclusion

AuraGain provided better ISP, initial airway pressure, overall success rate & fibreoptic view compared to LMA Supreme new cuff. The time to device insertion and additional airway manoeuvres were comparable between groups. Overall, AuraGain consistently provided higher seal pressures and a clear glottic view, offering the possibility to guide direct tracheal intubation if required.

Reference: Lopez, A. M. *et al.* (2016) 'A randomized comparison of the Ambu AuraGain versus the LMA supreme in patients undergoing gynaecologic laparoscopic surgery', *Journal of Clinical Monitoring and Computing*. Springer Netherlands, 31(6), pp. 1255–1262. doi: 10.1007/s10877-016-9963-0.

AuraGain vs. LMA Supreme

A randomised comparison of the Ambu® AuraGain™ and the LMA® Supreme in infants and children

Jagannathan, N. et al. (2016). Anaesthesia. 71(2) : 205–212.

2 level

Key Points

- **AuraGain: 13** vs. LMA S 13 — SAD insertion time (seconds av.)
- **AuraGain: 22 [18-26]** vs. LMA S 20 [16-26] — Oropharyngeal leak pressure
- **AuraGain 100%** vs. LMA S 86% — Airway quality (clear)

Study Overview

An RCT to compare AuraGain & LMA Supreme for:

- **Oropharyngeal leak pressure (OLP)**
- **Median time to device insertion (seconds)**
- **First-attempt success rate**
- **Ease of SAD & gastric tube insertion**
- **Airway quality & additional manoeuvres (AM)**

Methods

The study comprised of: 100 children (Median age 21 month) undergoing elective surgery with ASA physical status of I-III

AuraGain: 50 patients; size 1.5, 5–10 kg; size 2, 10–20 kg

LMA Supreme: 50 patients; size 1.5, 5–10 kg; size 2, 10–20 kg

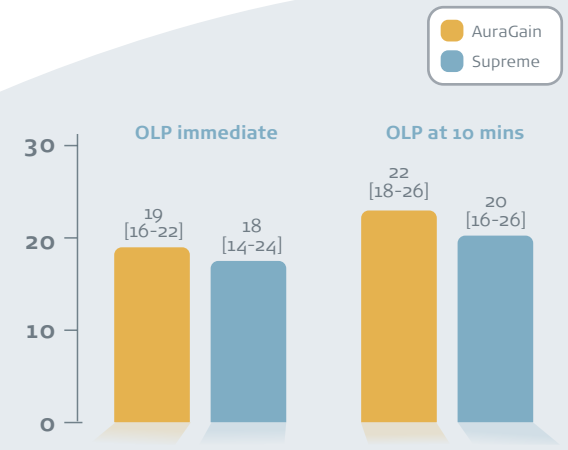

Fig. 1. OLP (cm H_2O) measured immediately and 10 mins post-insertion (median, IQR)

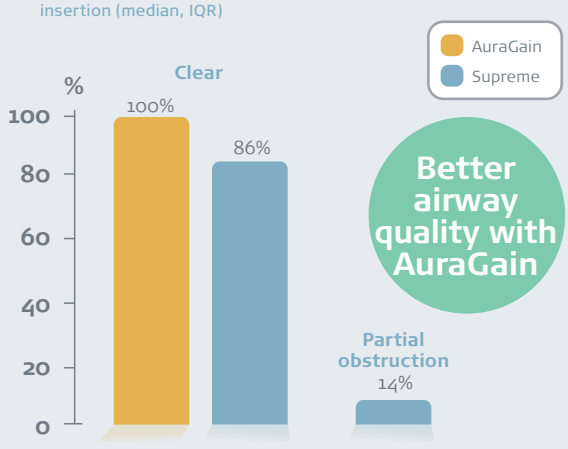

Fig. 2. Airway quality during the maintenance of anaesthesia

Key Findings

1. The OLP (cmH_2O) measured immediately after insertion & 10 minutes post-insertion were comparable between groups (Figure 1).
2. Time to successful SAD insertion was comparable between AuraGain (13 [12-15]) & LMA Supreme (13 [12-14]) group.
3. First-attempt success rate was 96% for AuraGain vs. 100% for LMA Supreme; both devices achieved 100% success rate overall.
4. It was slightly easier to insert LMA Supreme, however, AuraGain did not require additional manoeuvres, whereas LMA Supreme did (14%).
5. The ease of gastric tube insertion was comparable between groups.
6. The airway quality during the maintenance of anaesthesia was better in the AuraGain group (100% clear) vs. LMA supreme (86% clear & 14% partial obstruction) (Figure 2).

Conclusion

The OLP, device insertion time, ease of gastric tube insertion & success rate were comparable between groups. It was slightly easier to insert LMA Supreme, however, it required additional adjustment. The airway quality was better in the AuraGain group. Clinicians may consider AuraGain for intubation conduit due to its lower cost & comparable, if not better performance, when compared with the LMA Supreme.

Reference: Jagannathan, N. *et al.* (2016) 'A randomised comparison of the Ambu® AuraGain™ and the LMA® supreme in infants and children', *Anaesthesia*. Blackwell Publishing Ltd, 71(2), pp. 205–212. doi: 10.1111/anae.13330.

AuraGain vs. LMA Supreme

LMA Supreme™ and Ambu® AuraGain™ in anaesthetised adult patients: a prospective observational study

Kriege, M. et al. (2017). Minerva Anestesiologica. pp. 165–174.

2 level

Key Points

AuraGain: 92% vs. Supreme 89% — Success rate

AuraGain: 87% vs. Supreme 90% — SAD insertion (easy/moderate)

AuraGain: 92% vs. Supreme 92% — Gastric tube insertion (easy)

Study Overview

An observational study to evaluate AuraGain & LMA Supreme for:

- **First-attempt & overall success rate**
- **Median time to device insertion (seconds)**
- **Physician experience with SAD**
- **Ease of SAD & gastric tube insertion**

Methods

The study comprised of: 351 cases (median age 61.5 years) undergoing elective surgery

AuraGain: 174 cases; size 3 (n=7), size 4 (n=93), size 5 (n=74)

LMA Supreme: 177 cases; size 3 (n=6), size 4 (n=96), size 5 (n=75)

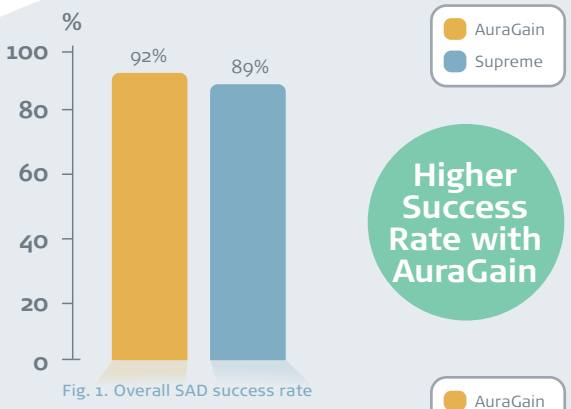

Fig. 1. Overall SAD success rate

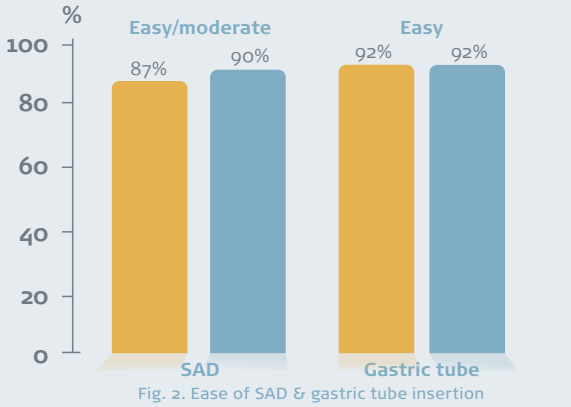

Fig. 2. Ease of SAD & gastric tube insertion

Key Findings

1. First-attempt success rate was 72% for AuraGain vs. 80% for LMA Supreme; however, overall success rate was higher for AuraGain (Figure 1).
2. Time to successful SAD insertion was longer in AuraGain (30 [18-40]) group compared to the LMA Supreme (18 [13-25]) group.
3. Physician's level of experience with both devices was reported. AuraGain group had significantly more (26%) novice users vs. LMA Supreme (13%).
4. 87% of the cases in AuraGain group was either easy or moderately easy to insert vs. 90% in LMA Supreme group (Figure 2).
5. Ease of gastric tube insertion was comparable (Figure 2):

   Easy = AuraGain 92% vs. LMA 92%
   Moderate = AuraGain 6% vs. LMA 6%
   Difficult/impossible= AuraGain 2% vs. LMA 2%

Conclusion

The first attempt and overall SAD insertion success rates were comparable between the AuraGain and the LMA Supreme groups. There were significantly more novices and less experienced physicians in the AuraGain group, explaining the extended device insertion time. Once the devices were in place, there was no difference between the ease of gastric tube insertion.

Reference: Kriege, M. *et al.* (2017) 'LMA Supreme™ and Ambu® AuraGain™ in anesthetized adult patients: A prospective observational study', in *Minerva Anestesiologica*. Edizioni Minerva Medica, pp. 165–174. doi: 10.23736/S0375-9393.16.11112-5.

AuraGain vs. LMA Supreme

Ambu® AuraGain™ vs. LMA Supreme in overweight and obese females: A randomized crossover study

Michalek, P. et al. (2020). Trends Anaesth Crit Care. 30: e179.

2 level

Study Overview

An RCT to compare AuraGain & LMA Supreme for:

- **Oropharyngeal seal pressure (OSP)**
- **Success rate**
- **Time to device insertion (seconds)**
- **Fibreoptic view**

Methods

Overweight and obese women (BMI >35) were included, who were going under elective surgery under general anaesthesia.

Key Findings

1. Higher sealing pressures were recorded with AuraGain -33.3 cmH_2O than with LMA Supreme -30.7 cmH_2O.
2. The overall success rate of insertion was equally very high in both groups, while the frequency of the first-attempt insertion was higher for the LMA Supreme.
3. LMA Supreme was inserted faster (17.6 vs. 20.1 s). However, Fibreoptic scores were better in the AuraGain group.
4. AuraGain showed higher sealing pressures than LMA Supreme, with better fibreoptic access to the trachea. It could favour its use in laparoscopy, obese patients and difficult intubation.

AuraGain vs. LMAs & tubes

Performance and skill retention of five supraglottic airway devices for the paediatric difficult airway in a manikin

Kulnig, J. et al. (2018). Eur J Pediatr. 177(6), pp. 871–878.

5 level

Study Overview

A crossover assessment of AuraGain, Air-Q, EasyTube (EZT), Laryngeal tube (LT), laryngeal mask airway (LMA) and conventional endotracheal tube (ETT) on a paediatric manikin for:

- **First attempt success rate**
- **Time to successful device placement**

Methods

The study involved 41 paediatricians with varying clinical experience

Airway scenarios:

A - Standard physiologic airway conditions (STD);

B - Pathological airway conditions such as tongue oedema (TE), and limited mobility of the cervical spine (CS)

Key Findings

1. Air-Q, AuraGain and LT achieved 100% first-attempt success rate within the 30s by all participants under STD. The success rates for ET, LMA and EZT were 87.80%, 95.12% and 80.49%, respectively.
2. In TE scenario, Air-Q and LT had the highest first attempt success rate (100%). The success rates for ET, LMA, AuraGain and EZT were 21.95%, 70.73%, 90.24% and 51.22%, respectively.
3. In CS scenario, Air-Q, AuraGain and LT were inserted within the 30s. The success rate for ET, LMA and EZT were 53.66%, 82.93%, and 9.76%, respectively.
4. Under TE conditions, there were significantly longer insertion times for the ET, LMA, and EZT. Under CS conditions, there were significantly longer insertion times for the ET, LMA, LT, and EZT.
5. LT, AuraGain, and Air-Q were superior in providing fast and effective ventilation during simulated difficult airway situations in paediatricians.

References:

Michalek, P., Brozek, T. and Blaha, A. (2020) 'AuraGain vs. LMA Supreme in overweight and obese females: A randomized crossover study', *Trends in Anaesthesia and Critical Care*. Elsevier BV, 30, p. e179. doi: 10.1016/j.tacc.2019.12.439.

Kulnig, J. *et al.* (2018) 'Performance and skill retention of five supraglottic airway devices for the pediatric difficult airway in a manikin', *European Journal of Pediatrics*. Springer Verlag, 177(6), pp. 871–878. doi: 10.1007/s00431-018-3134-x.

AuraGain vs. Multiple SADs

Comparison of supraglottic airway devices in laparoscopic surgeries: A network meta-analysis

Yoon, S. W. et al. (2019). J Clin Anesth. 55: 52–66.

1 level

Key Points

- **AuraGain =** highest OLP before **pneumoperitoneum** — Oropharyngeal leak pressure
- **AuraGain =** highest PIP before **pneumoperitoneum** — Peak inspiratory pressure
- **AuraGain = Easy access** — Gastric tube insertion

Study Overview

A network meta-analysis to compare 8 SADs for:

- **Oropharyngeal leak pressure (OLP) before and after pneumoperitoneum**
- **Peak inspiratory pressure (PIP) before and after pneumoperitoneum**
- **Gastric tube insertion success rate**

Methods

Total of 103 RCTs were identified. Only RCTs that are comparing two or more SADs for laparoscopic surgery were included. 26 RCTs from 13 different countries, involving 2142 patients with ASA classification I-III were included in the network meta-analysis

Devices: Streamlined Liner of the Pharynx Airway (SLIPA), LMA Classic (LMA-C), LMA ProSeal (LMA-P), LMA Supreme (LMA-S), i-gel, Laryngeal tube suction (LTS), CobraPLA and AuraGain

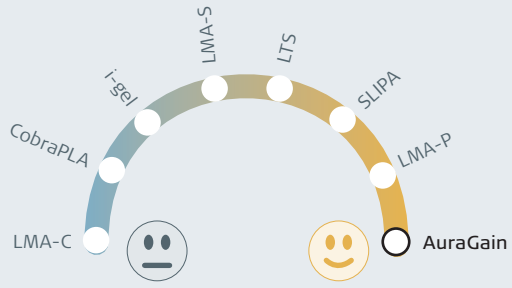

Fig. 1. OLP ranks of SADs before pneumoperitoneum

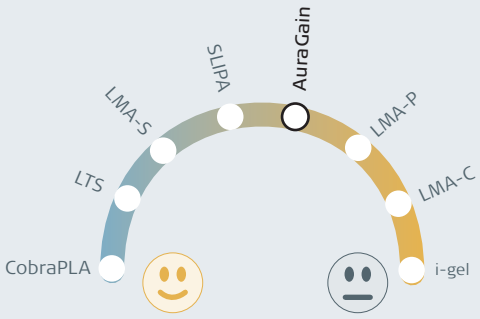

Fig. 2. PIP ranks of SADs after pneumoperitoneum

Key Findings

1. OLP before pneumoperitoneum: AuraGain had the highest OLP (Figure 1).
2. OLP after pneumoperitoneum: AuraGain was not included in the OLP after pneumoperitoneum group; only 4 SGAs were compared and i-gel had the highest OLP.
3. PIP before pneumoperitoneum: AuraGain had the highest PIP.
4. PIP after pneumoperitoneum: highest is i-gel, followed by LMA-C and LMA-P (Figure 2).
5. Gastric tube insertion success rate: highest in LMA-C followed by LMA-P and AuraGain, then LTS, LMA-P, i-gel being the lowest.

Conclusion

Ambu AuraGain showed an effective sealing pressure without airway leakage during laparoscopic surgeries. The gastric tube insertion success rate of AuraGain was comparable to that of LMA-P and LTS, while i-gel showed the lowest rate.

Reference: Yoon, S. W. *et al.* (2019) 'Comparison of supraglottic airway devices in laparoscopic surgeries: A network meta-analysis', *Journal of Clinical Anesthesia*. Elsevier Inc., 55, pp. 52–66. doi: 10.1016/j.jclinane.2018.12.044.

AuraGain vs. Multiple SADs

Comprehensive evaluation of manikin-based airway training with second generation supraglottic airway devices

Schmutz, A. et al. (2019). Ther Clin Risk Manag. 15: 367–376.

5 level

Study Overview

An evaluation of two airway manikins with 5 different SADs for:

- **Feasibility of ventilation**
- **Oropharyngeal leak pressure (OLP)**
- **Ease of gastric tube insertion, insertion time & position**

Methods

The study comprised of 80 anaesthesia residents, with experience of more than 100 SAD insertions.

Airway Manikins: TruCorp AirSim® and Laerdal Resusci Anne® Airway Trainer™

SADs: LMA® Supreme™ [LMA], Ambu® AuraGain™, i-gel®, KOO™-SGA and LTS-D™

Sizes: LMA and AuraGain™ (size 3); KOO™-SGA and LTS-D (size 4); i-gel® (size 5)

Key Findings

1. Ventilation was feasible with all combinations of SAD and manikin. By contrast, an OLP exceeding 10 cmH_2O could be reached with most of the SADs in the TruCorp but with the LTS-D only in the Laerdal manikin.
2. Gastric tube insertion was successful in above 90% in the Laerdal vs 87% in the TruCorp manikin ($p<0.009$). Insertion times differed significantly between manikins.
3. The SAD positions were better in the Laerdal manikin for LMA, AuraGain, i-gel and LTS-D. Participant's assessments were superior in the Laerdal manikin for LMA, AuraGain, i-gel and KOO-SGA.
4. In order to achieve the best performance during training, the airway manikin should be chosen depending on the SAD in question.

AuraGain™ Evidence Compendium

AuraGain vs. Multiple SADs

Direct and indirect low skill fibreoptic intubation: a randomised crossover manikin study of six supraglottic airway devices

Chow, S. Y. et al. (2018). Indian J Anaesth. 62(5), pp. 350–358.

5 level

Study Overview

An evaluation of direct or indirect fibreoptic intubation (FOI) with 6 different first and second generation SADs for:

- **Intubation success rate**
- **Time to intubation**
- **Ease of use & device preference**

Methods

- The study comprised of 30 anaesthesiologists (15 senior, 15 junior)
- **SAD:** Classic LMA, Air-Q, ProSeal, LMA protector, i-gel and AuraGain™
- **Sizes:** size 3 for all the SADs except size 2.5 for the Air-Q
- **Tube size:** 5.0 mm tube for the Proseal LMA and LMA Supreme and 6.0 mm tube for the remaining SADs

Key Findings

1. AuraGain was the only SAD with 100% intubation success rate; however, there was no significant difference regarding success rate between types of SAD, whether using the direct or indirect method for intubation.
2. Intubation time was significantly shorter in AuraGain ($p<0.001$) than all other SADs overall by 12 and 27.4 s (mean difference) for direct and indirect FOI, respectively. Comparing SAD groups, intubation time was significantly shorter with the second generation SADs.
3. The AuraGain had the least SAD-related difficulties when compared to all the other SADs, and it had the least FOB-related difficulties when compared to Classic LMA and Proseal ($p<0.001$).
4. The most preferred SAD for both direct and indirect FOI was the AuraGain.

References:
Schmutz, A. *et al.* (2019) 'Comprehensive evaluation of manikin-based airway training with second generation supraglottic airway devices', *Therapeutics and Clinical Risk Management*. Dove Medical Press Ltd., 15, pp. 367–376. doi: 10.2147/TCRM.S194728.

Chow, S. Y. *et al.* (2018) 'Direct and indirect low skill fibre-optic intubation: A randomised crossover manikin study of six supraglottic airway devices', *Indian Journal of Anaesthesia*. Indian Society of Anaesthetists, 62(5), pp. 350–358. doi: 10.4103/ija.IJA_156_18.

AuraGain vs. Multiple SADs

Limitations of paediatric supraglottic airway devices as conduits for intubation - an *in vitro* study

Kleine-Brueggeney, M. et al. (2018). Can J Anesth. 65(1), pp. 14–22.

5 level

Study Overview

An *in vitro* assessment of possible combination of SGAs and ETTs regarding:

- **Feasibility of passing & removing ETTs through paediatric SGAs**

Methods

The evaluation was performed by two independent investigators by independently grading the SGA-ETT combination

SGAs: Air-Q inflatable, Air-Q*sp*, AuraGain, Aura-i, AuraOnce, AuraStraight, i-gel and LMA Unique

ETTs: cuffed paediatric ETTs Mallinckrodt, Ruschelit, Microcuff, Sheridan; uncuffed ETTs Portex and Sheridan

Sizes: selected according to manufacturer recommendations.

Key Findings

1. The widest range of possible combinations was found with the Air-Q inflatable and the Air-Q*sp*, which can be used with a size 5.5 ETT in SGAs size 2.0 or larger. This was followed by AuraGain and Aura-i, and the passage of all sizes of tested cuffed ETTs was possible with a size 2.5 SGA with these devices.
2. Whenever intubation was possible, removal was possible for all SGAs with uncuffed ETTs. With many cuffed ETTs, however, SGA removal was impossible because the ETT cuff's pilot balloon was larger than the inner diameter of the SGA.
3. The use of combinations of SGA and ETTs with a size mismatch can lead to airway complications. The possibility of a mismatch between SGAs and ETTs should be taken into consideration while choosing these devices.

AuraGain™ Evidence Compendium

AuraGain vs. Multiple SADs

Choosing the best supraglottic airway for ophthalmic general anaesthesia: A manikin study

Seet, E. et al. (2020). J Clin Monit Comput. p. 1.

5 level

Study Overview

A manikin study to compare the 1st vs. 2nd generation SGAs for:

- **Vertical projection**

Methods

Each device was connected to a corrugated catheter mount or angled connector following insertion as per usual clinical practice.

Vertical projections of all devices were measured from the chin using a centimetre ruler.

Devices: LMA Classic, AuraFlex; LMA ProSeal, LMA Supreme, LMA Protector, AuraGain & i-gel

Key Findings

1. Securing of airway device to the chin with adhesive tape was possible for the LMA Classic and AuraFlex with straight corrugated connector, whereas the stiffer 2nd generations SGAs required the addition of an angled connector or straight corrugated tubing to direct the airway tube caudally, away from the surgical field.
2. The LMA ProSeal had the lowest vertical projection amongst the 2nd generation SGAs and may be the suitable choice for ophthalmic surgery.
3. A novel technique of utilising the 1st generation SGA with the placement of an orogastric tube was explored, although with some reservations.
4. Future studies should investigate the use of SGA in the clinical setting during ophthalmic surgery.

References:

Kleine-Brueggeney, M. *et al.* (2018) 'Limitations of pediatric supraglottic airway devices as conduits for intubation - an in vitro study', *Canadian Journal of Anesthesia*. Springer New York LLC, 65(1), pp. 14–22. doi: 10.1007/s12630-017-0992-z.

Seet, E. *et al.* (2020) 'Choosing the best supraglottic airway for ophthalmic general anaesthesia: a manikin study', *Journal of Clinical Monitoring and Computing*. Springer, p. 1. doi: 10.1007/s10877-020-00507-w.

AuraGain vs. Guedel tube

Flexible bronchoscopic intubation through the Ambu® AuraGain™ laryngeal mask versus a slit Guedel tube: a non-inferiority randomised-controlled trial

Moser, B. et al. (2017). Can J Anesth. 64(11): 1119–1128.

2 level

Key Points

- **AuraGain: 21** vs. G. Tube 24 — Intubation time (seconds av.)
- **AuraGain: 96%** vs. G. tube 95% — Intubation success rate
- **AuraGain = good FB view** — Fibreoptic view

Study Overview

An RCT to compare AuraGain & Guedel tube for:

- **Intubation time (seconds)**
- **Intubation success rate**
- **Ease of tracheal tube insertion**
- **Fibreoptic view* (FB)**

Methods

The study comprised of: 88 patients (age 60-65 years) undergoing orthopaedic surgery with ASA status of I-II

AuraGain: 45 patients;

Guedel tube: 43 patients;

ETT size: 7mm

Key Findings

1. All patients were successfully intubated. The time needed for intubation was comparable (Figure 1).
2. Intubation success rate was also comparable between groups (Figure 2).
3. It was easier to insert tracheal tube through AuraGain with 80% having no resistance vs. 70% in Guedel tube group.
4. The fibreoptic view (laryngeal alignment) was superior in the AuraGain group compared to the Guedel tube group:

Fibreoptic view score (%)	1	2	3	4
AuraGain	0	22	53	27
Guedel tube	0	33	58	9

*Fibreoptic view: 4 = only vocal cords visible; 3 = vocal cords plus posterior epiglottis visible; 2 = vocal cords plus anterior epiglottis visible; 1 = vocal cords not seen.

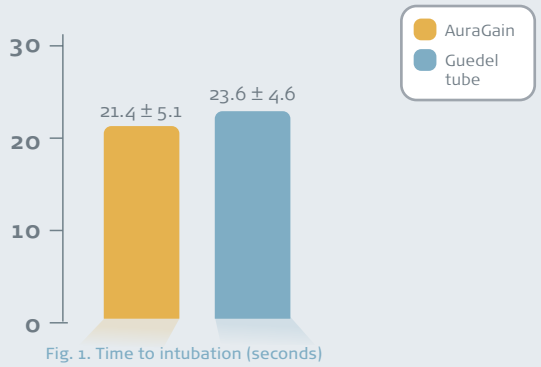

Fig. 1. Time to intubation (seconds)

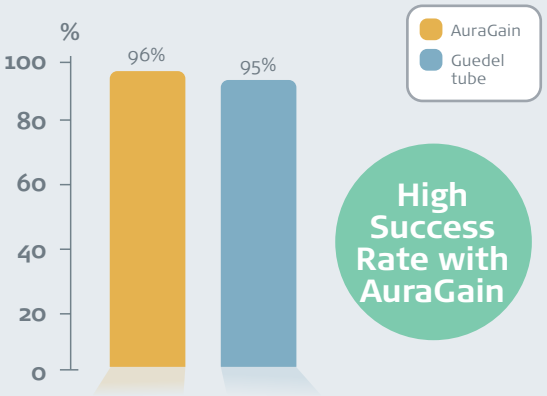

Fig. 2. First attempt intubation success rate

High Success Rate with AuraGain

Conclusion

The AuraGain demonstrated comparable intubation time, success rate and ventilation characteristics with Guedel tube. It aligned well with the glottis in a majority of patients as indicated by the fibreoptic view and the ease of ETT insertion. Bronchoscopic intubation with the AuraGain laryngeal mask can be performed at least as fast as regular bronchoscopic intubation.

Reference: Moser, B. *et al.* (2017) 'Flexible bronchoscopic intubation through the AuraGain™ laryngeal mask versus a slit Guedel tube: a non-inferiority randomized-controlled trial', *Canadian Journal of Anesthesia*. Springer New York LLC, 64(11), pp. 1119–1128. doi: 10.1007/s12630-017-0936-7.

AuraGain vs. ILTS-D

Ambu® AuraGain™ versus intubating laryngeal tube suction as a conduit for endotracheal intubation

Bruceta, M. et al. (2019). J Anaesthesiol Clin Pharmacol. 35(3), pp. 348–352

5 level

Study Overview

A crossover assessment of AuraGain and intubating laryngeal tube suction disposable (ILTS-D) on a manikin for:

- **Total intubation efficacy**
- **Time to successful SAD placement & blind intubation**

Methods

The study involved 80 participants (40 students, 40 anaesthesiologists)

Two arms: blind ETT insertion by medical students and fibreoptic guided ETT insertion by anaesthesiologists

Sizes: AuraGain (size 5), ILTS-D (size 5), ETT (7.5mm)

Key Findings

1. For blind intubation, the success rate for establishing a definitive airway with an ETT using the SGA as a conduit was significantly higher with ILTS-D (82.5%) compared with AuraGain (20.0%).
2. In the fibreoptic guided intubation group, the rate of successful intubation was comparable between the ILTS-D (84.6%) and the AuraGain (71.8%).
3. In both arms, the median time needed for SGA insertion was similar; however, time to intubation was longer with the AuraGain group compared to the ILTS-D group.
4. Both devices were successful in establishing an airway. Further clinical trials are warranted.

AuraGain vs. laryngoscope

The effectiveness of paediatric blind intubation using an Ambu® AuraGain™ disposable laryngeal mask - a randomised, cross-over, simulation trial

Bielski, A., Szarpak, L. and Pyda, S. (2018). Pediatr Pol J Paediatr. 93(5), pp. 377–382

5 level

Study Overview

A crossover assessment of AuraGain & Macintosh blade (MAC) laryngoscope as a guide for tracheal tube during simulated CPR for:

- **Intubation success rate**
- **Time taken for intubation**
- **Ease of use & device preference**

Methods

The study comprised of 56 final year medical students with no prior experience with SGAs and blind intubation

Two intubation techniques: ETT intubation with direct laryngoscopy (MAC size 2) or blind intubation with AuraGain

Airway scenarios:

A Normal airway without chest compressions;

B Normal airway with continuous chest compressions ET

Tube size: 5.0 mm tube

Key Findings

1. The median time of intubation in CPR without chest compressions using MAC and AuraGain was 32 s (IQR; 27–41.5) and 30 s (IQR; 22–43), respectively. However, the first attempt success rate was higher with AuraGain (48.2%) compared to MAC (28.6%).
2. The overall efficiency of MAC decreased with the addition of chest compression. Compared to MAC, blind intubation using AuraGain as the guide for the endotracheal tube was associated with shorter intubation time (32 s [IQR; 22–45] and 47 s [IQR; 33–57], $p = 0.017$), significantly better first attempt (33.9% and 5.4%, $p = 0.002$) and overall intubation success rate (73.2% and 46.2%, $p<0.001$).
3. The participants of the study using the AuraGain rated the level of ease at 35 points (IQR; 32-39), which is statistically easier than intubation using MAC, with 74 points (IQR; 61-83) ($p<0.001$).
4. AuraGain was associated with more effective ETT intubation than direct laryngoscopy.

References:

Bruceta, M. *et al.* (2019) 'Ambu AuraGain versus intubating laryngeal tube suction as a conduit for endotracheal intubation', *Journal of Anaesthesiology Clinical Pharmacology*. Wolters Kluwer Medknow Publications, 35(3), pp. 348–352. doi: 10.4103/joacp.JOACP_214_17.

Bielski, A., Szarpak, L. and Pyda, S. (2018) 'The effectiveness of paediatric blind intubation using an Ambu® AuraGain™ Disposable Laryngeal Mask-a randomised, cross-over, simulation trial', *Pediatria Polska-Polish Journal of Paediatrics*, 93(5), pp. 377–382. doi: 10.5114/polp.2018.80688.

AuraGain

A cohort evaluation of clinical use and performance characteristics of Ambu® AuraGain™ : a prospective observational study

Parikh, D. A. et al. (2017). Indian J Anaesth. 61(8): 636–642.

2 level

Key Points

- AuraGain: 95% — Intubation success rate
- AuraGain: 24 [20-28] — Oropharyngeal leak pressure
- AuraGain = good FB view — Fibreoptic view

Study Overview

A prospective observational study to evaluate AuraGain for:

- **Oropharyngeal leak pressure (OLP)**
- **Time to device insertion & intubation (Seconds)**
- **Device insertion & intubation success rate**
- **Fibreoptic view* (FB)**
- **Ease of SAD & ETT insertions**

Methods

The study comprised of: 100 cases (mean age 31 years) undergoing elective surgery with ASA status I-II

AuraGain: 100 cases; size 3 (n=51), size 4 (n=49)

Gastric tube size: 16 Fr

ETT size: 6.5 mm for size 3 and 7.5 mm for size 4

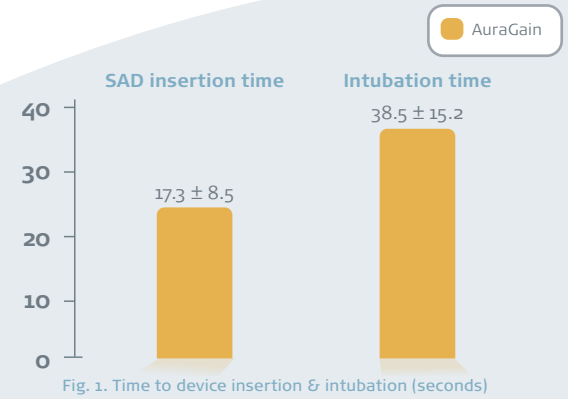

Fig. 1. Time to device insertion & intubation (seconds)

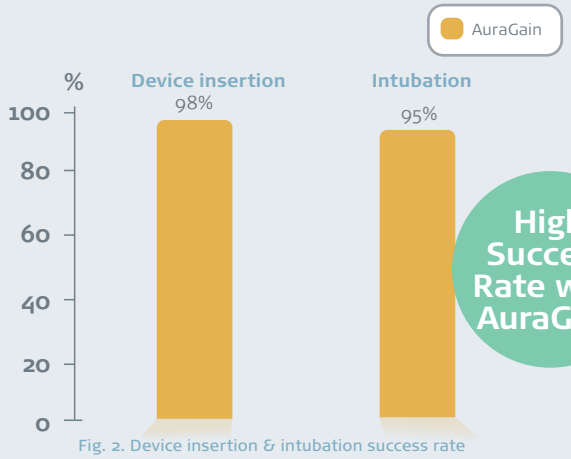

Fig. 2. Device insertion & intubation success rate

High Success Rate with AuraGain

Key Findings

1. The median OLP (cmH_2O) was 24 [20-28].
2. Time to successful SAD insertion was 17.3 ± 8.5; overall intubation time was 38.5 ± 15.2 (Figure 1).
3. First-attempt SAD insertion success rate was 98% and intubation success rate was 95% (Figure 2).
4. 88% of the cases, there was no resistance with SAD insertion. In 11% of the cases there was moderate resistance and only 1% had high resistance. In 94% of the cases, it was easy to pass gastric tube and only 6% had some difficulty.
5. AuraGain aligned well with the glottis in majority of patients as indicated by the fibreoptic view score:

FB score (%)	1	2	3	4
AuraGain	3	29	39	29

*Fibreoptic view: 4 = only vocal cords seen; 3 = vocal cords plus posterior epiglottis seen; 2 = vocal cords plus anterior epiglottis seen; 1 = vocal cords not seen, but function adequate; 0 = failure to function where vocal cords not seen fibreoptically.

Conclusion

AuraGain demonstrated a good level of utility as an alternative SAD with respect to ease of insertion, seal pressures and ventilation characteristics. It aligned well with the glottis in the majority of patients as indicated by the fibreoptic view and the ease of gastric tube insertion. The AuraGain can be an adequate ventilating device with an overall 100% insertion rate with timeframes comparable to other SADs.

Reference: Parikh, D. A. *et al.* (2017) 'A cohort evaluation of clinical use and performance characteristics of Ambu® AuraGain™: A prospective observational study', Indian Journal of Anaesthesia. *Indian Society of Anaesthetists*, 61(8), pp. 636–642. doi: 10.4103/ija.IJA_285_17.

AuraGain vs. AuraOnce

Ambu® AuraGain™ versus Ambu® AuraOnce™ in children: a randomised, crossover study assessing oropharyngeal leak pressure and fibreoptic position

Stögermüller, B. et al. (2019). Can J Anesth; 66: 57–62.

2 level

Study Overview

A crossover RCT to compare AuraGain & AuraOnce for:

- **Oropharyngeal leak pressure (OLP, cmH_2O)**
- **SAD insertion time**
- **Success rate**
- **Fibreoptic view**

Methods

The study comprised of 50 children (1.5-6 years) undergoing elective surgery with ASA status of I-II

Both devices were inserted consecutively in each patient.

Size 2 was used for both devices.

Key Findings

1. The OLP with AuraGain and AuraOnce were 21.7 ± 7 and 19 ± 6 cmH_2O, respectively. The mean insertion time was slightly better for the AuraOnce than for the AuraGain, 8 ± 3 vs 10 ± 4 seconds, respectively.
2. The first attempt success rate was 100% for both of the devices, and there was no difference regarding the fibreoptic score. No signs for blood staining were found on any mask.
3. AuraGain is a good alternative to the AuraOnce and an efficient device for children in this age group.

AuraGain

Effect of immobilised cervical spine on oropharyngeal sealing pressure with Ambu® AuraGain™ supraglottic airway: a randomised crossover trial

Uthaman, D. et al. (2019). Indian J Anaesth. 63: 388–393.

2 level

Study Overview

A crossover RCT to evaluate AuraGain with or without hard cervical collar for cervical spine stabilisation:

- **Oropharyngeal leak pressure (OLP, cmH_2O)**
- **Number of attempts**
- **SAD insertion time**
- **Fibreoptic view**

Methods

The study comprised of 35 patients (40.4 ± 11.3 years) undergoing elective surgery with ASA status of I-III

AuraGain was inserted twice in a crossover manner, once with and once without a hard cervical collar, with the sequence of insertion randomised.

AuraGain: Size 4

Key Findings

1. The mean OLPs in both the groups were similar with no significant difference (29.6 ± 3.7 cmH_2O without collar and 30.1 ± 3.1 cmH_2O with collar [p = 0.310]).
2. The number of attempts taken for successful insertion of AuraGain was almost similar with or without a collar (p= 0.7); however, it was easier to insert AuraGain without the collar (p=0.001).
3. There was a statistically significant increase in time for placement of AuraGain in the group with the cervical collar (26.1 ± 11.7 vs 21.3 ± 9.6), the mean time difference was only 4.8 seconds, which may not be clinically significant in anaesthetic practice.
4. The AuraGain can be used to provide effective ventilation in patients whose cervical spine is immobilised with a hard cervical collar.

References:

Stögermüller, B. *et al.* (2019) 'Ambu® Aura Gain™ versus Ambu® Aura Once™ in children: a randomized, crossover study assessing oropharyngeal leak pressure and fibreoptic position', *Canadian Journal of Anesthesia*. Springer New York LLC, 66(1), pp. 57–62. doi: 10.1007/s12630-018-1235-7.

Uthaman, D. *et al.* (2019) 'Effect of immobilised cervical spine on oropharyngeal sealing pressure with Ambu® AuraGain™ Supraglottic airway: A randomised crossover trial.', *Indian journal of anaesthesia*, 63(5), pp. 388–393. doi: 10.4103/ija.IJA_787_18.

AuraGain

The effect of neck extension on success rate of blind intubation through Ambu® AuraGain™ laryngeal mask: a randomised clinical trial

Yoo, S. et al. (2019). Can J Anesth.(66).

2 level

Study Overview

An RCT to evaluate AuraGain with assigned neck positions for:

- **SAD insertion time & success rate**
- **Intubation time & success rate**

Methods

The study comprised of 121 patients (average age: 53 years) undergoing elective surgery with ASA status of I-II

Neck extension group: 59 patients

Neutral group: 62 patients

AuraGain size: Size 3 females, size 4 males

Key Findings

1. The median SAD insertion time for neck extension and neutral groups were 23 [18-27] and 21 [18-27] seconds, respectively. The SAD first attempt success rate was slightly higher with the neck extended (97%) compared to the neutral position (92%).
2. The first attempt and overall intubation success rates were significantly higher in the neck extension group (68% and 71%) compared to the neutral group (47% and 50%). However, the time required for intubation was similar.
3. Neck extension can improve the success rate of blind intubation through AuraGain.

AuraGain™ Evidence Compendium

AuraGain

Influence of head and neck position on performance of the Ambu® AuraGain™ laryngeal mask: a randomised crossover trial

Yoo, S. et al. (2019). Minerva Anestesiol. 85: 133–138.

2 level

Study Overview

An RCT to evaluate AuraGain with assigned head and neck positions for:

- **Oropharyngeal leak pressure (OLP)**
- **Fibreoptic view**

Methods

The study comprised of 39 patients (51 ± 16 years) undergoing elective surgery with ASA status of I-III

AuraGain was inserted in all cases at different neck positions in a crossover manner, including neutral, maximal flexion (within 45˚), maximal extension (within 60˚) and maximal right rotation (within 80˚) in a random order.

AuraGain: size 3 (n=4), size 4 (n=32), size 5 (n=3)

Key Findings

1. The mean OLPs were 26.6 ± 7.5, 32.1 ± 7.2, 22.0 ± 6.8 and 25.6 ± 6.7 cmH_2O in neutral, flexion, extension and right rotation positions, respectively. The difference between neutral, flexion and extension positions were significant ($p<0.001$; $p=0.001$).
2. The fibreoptic view score was higher (better alignment with the glottic inlet) in the extended neck position ($p<0.001$) and the right rotated head and neck position ($p<0.001$) but similar in the flexed neck position ($p=0.172$) compared with that in the neutral position.
3. The view of the vocal cords was significantly better with neck extension an right rotation of the head and neck, whereas the view deteriorated significantly with neck flexion compared with that in the neutral position.
4. Neck flexion can be used when a better oropharyngeal seal is needed and neck extension, and right rotation of the head and neck may facilitate endotracheal intubation using the AuraGain as a conduit.

References:

Yoo, S. *et al.* (2019) 'The effect of neck extension on success rate of blind intubation through Ambu® AuraGain™ laryngeal mask: a randomized clinical trial', *Canadian Journal of Anesthesia*. Springer International Publishing, (66). doi: 10.1007/s12630-019-01353-4.

Yoo, S. *et al.* (2019) 'Influence of head and neck position on performance of the Ambu® AuraGain™ laryngeal mask: A randomized crossover study', *Minerva Anestesiologica*. Edizioni Minerva Medica, 85(2), pp. 133–138. doi: 10.23736/S0375-9393.18.12579-X.

AuraGain

Flexion decreases the ventilation quality of the Ambu® AuraGain™ laryngeal mask in paralysed children: a prospective randomised crossover study

Lee, J. H. et al. (2018). Acta Anaesthesiol Scand. 62: 1080–1085.

2 level

Study Overview

A crossover RCT to evaluate AuraGain with assigned neck positions for:

- **Oropharyngeal leak pressure (OLP)**
- **Fibreoptic view**

Methods

The study comprised of 39 children (average age: 2.9 years) undergoing elective surgery with ASA status of I-II

AuraGain was inserted in all cases at different neck positions in a crossover manner, including neutral head an nect position, and then for the flexed, extended and rotated head and neck positions in a random order.

AuraGain size: size 1.5 (n=13), size 2 (n=15), size 2.5 (n=11)

Key Findings

1. The mean OLPs were 26.2 ± 6.7, 33.9 ± 7.2, 23.6 ± 5.8 and 22.2 ± 7.1 cmH_2O in neutral, flexion, extension and right rotation positions, respectively. Compared to the neutral position, the OLPs were significantly different in the flexion, extension and right rotation positions ($p<0.001$; $p=0.014$; $p=0.002$).
2. There was a significant deterioration of fibreoptic view in flexion ($p=0.025$), while a significant improvement in extension ($p=0.008$) and right rotation positions ($p< 0.001$) compared to the neutral position.
3. Clinically, the flexed head and neck position can be used when a better oropharyngeal seal is needed. However, the neutral, extended and rotated neck position can be used in paediatric patients for more effective ventilation with the AuraGain.

AuraGain™ Evidence Compendium

AuraGain

Descriptive study of ultrasound images of the upper airway obtained after insertion of laryngeal mask

Pérez-Herrero, M. A. et al. (2018). Rev Esp Anestesiol Reanim. 65: 434–440.

2 level

Study Overview

A prospective observation study to evaluate AuraGain for:

- **Ultrasound scan taken before, after insertion and after removal of the AuraGain**

Methods

The study comprised of 30 patients (61±12.3 years) undergoing abdominal surgery

AuraGain: size 4 (n=20, females), size 5 (n=10, males)

Key Findings

1. The blind insertion of the masks did not present difficulties in 24 (80%) patients. Air leakage was detected in 8 (26.7%) patients, which was moderate in 7 cases and severe in one of them.
2. The ultrasound findings confirmed good mask placement in 22 (73.3%) patients. Anatomical airway changes after laryngeal mask extraction were only observed in 3 (12%) patients, all of them were minor.
3. There was a statistically significant association ($p<0.05$) between difficulty in inserting the device and the level of air leakage.
4. Upper airway ultrasound is a useful diagnostic method to evaluate laryngeal mask placement. Laryngeal oedema was not observed after removal of the device.

References:

Lee, J. H. *et al.* (2018) 'Flexion decreases the ventilation quality of the Ambu® AuraGain™ laryngeal mask in paralysed children: A prospective randomised crossover study', *Acta Anaesthesiologica Scandinavica*. Blackwell Munksgaard, 62(8), pp. 1080–1085. doi: 10.1111/aas.13148.

Pérez-Herrero, M. A. *et al.* (2018) 'Descriptive study of ultrasound images of the upper airway obtained after insertion of laryngeal mask', *Revista Espanola de Anestesiologia y Reanimacion*. Elsevier Doyma, 65(8), pp. 434–440. doi: 10.1016/j.redar.2018.05.004.

AuraGain

The use of an EBUS TBNA Friendly larynx mask

Krasnik, M. (2017). *IASLC 18th World Conference on Lung Cancer.* J THORAC ONCOL. p. S2374.

4 level

Study Overview

A case series to evaluate AuraGain during endobronchial ultrasound guided trans-bronchial needle aspiration (EBUS-TBNA) for:

- **First-attempt success rate**
- **Ease of maneuvering an EBUS scope via the AuraGain**
- **Fibreoptic assessment**
- **Intracuff & Peak pressure**

Methods

The study comprised of 20 patients with ASA status of II-III undergoing EBUS-TBNA

AuraGain size 3, 4 or 5 were used

Key Findings

1. First attempt insertion success rate was 95% with an overall success rate of 100%.
2. 90% recorded passing an EBUS scope as being with little resistance, moderate resistance was felt in 2 cases, and no records of high resistance was experienced.
3. Fibreoptic assessment of the alignment of AuraGain and the trachea was recorded as 100% satisfactory to accommodate the performance of the EBUS procedure with needle aspiration of lymphoid nodes of down 3.mm.
4. Average intracuff pressure to obtain seal was 55.55 cmH_2O, and ventilation was performed without a leek at up to pPeak of 35 cmH_2O which was the maximum pressure permitted.
5. The AuraGain was effectively utilized for airway management and with a high degree of success as a conduit for EBUS-TBNA.

AuraGain™ Evidence Compendium

AuraGain

Ambu® AuraGain™ laryngeal mask as a method of airway management of patient entrapped in vehicle

Wieczorek, W. et al. (2019). *Correspondence.* AM J EMERG MED. 37(1), pp.171-172.

5 level

Study Overview

A randomised, open label, crossover simulation study to evaluate AuraGain in patients jammed in a vehicle for:

- **Time to achieve airway patency with SGA**
- **Ease of use**
  (0 = extremely easy, 100 = extremely difficult)

Methods

The study involved 45 firefighters and a brief training was provided.

Airway scenarios:

A Manual stabilisation of the cervical spine performed by an independent instructor from the back seat

B Immobilization of the cervical spine with a cervical collar

Key Findings

1. In the conducted simulation study, all participants of the study were able to maintain the airway patency with the use of AuraGain laryngeal mask in both research scenarios during their first attempt.
2. Median airway time in Scenario A was 17.5 s (IQR, 14–20) vs. 18 s (IQR, 14–21) for scenario B.
3. The easiness of maintaining the airway patency in both scenarios was comparable, and it amounted for 16 (IQR; 11–21) vs. 17 (IQR; 13–20) points for Scenario A and B, respectively.
4. In summary, the maintenance of airway patency with the use of AuraGain laryngeal mask is, in the opinion of the surveyed firefighters, an easy procedure when dealing with a patient who is jammed in the vehicle.

References:

Krasnik, M. (2017) 'PUB028 The Use of an EBUS TBNA Friendly Larynx Mask', in *IASLC* 18th World Conference on Lung Cancer. Journal of Thoracic Oncology, p. S2374. doi: 10.1016/j.jtho.2017.09.1891.

Wieczorek, W., Gawel, W. B. and Kaminska, H. (2019) *Ambu® AuraGain™ laryngeal mask as a method of airway management of patient entrapped in vehicle, Correspondence.* The American Journal of Emergency Medicine. doi: 10.1016/j.ajem.2018.05.068.

AuraGain

Tracheal intubation through Ambu® AuraGain™ laryngeal mask during routine clinical practice

Castro, S. M. et al. (2018). Trends Anaesth Crit Care. 23: 24–25.

2 level

Study Overview

An observational study to evaluate AuraGain for:

- **Time to intubation (seconds)**
- **First-attempt success rate**
- **Directed & guided intubation**

Methods

The study comprised of: 31 patients undergoing elective surgery.

After anaesthetic induction, the AuraGain laryngeal mask was placed. AuraGain was used as an intubation conduit.

Key Findings

1. All patients were intubated at the first attempt (100%) in a mean total time of 19.61 ± 14.01 seconds (range 8-75).
2. In 19 cases, it was necessary to correct the position of the laryngeal tube. There were no problems during the removal of the device.
3. 61.35% was directed intubation, and 38.7% was guided intubation.
3. It can be assured that the AuraGain laryngeal mask is a safe, easy and fast insertion device, useful for achieving effective ventilation as well as allowing immediate intubation with the support of a flexible video endoscope.

AuraGain™ Evidence Compendium

AuraGain

Fiberoptic intubation through laryngeal mask in a patient who had formally refused an awake intubation

Ivars, C. et al. (2017). Trends Anaesth Crit Care. 12: 33–34.

4 level

Study Overview

A case study to evaluate AuraGain during a fibreoptic intubation.

Methods

Case: a patient with all the factors predicting a difficult airway (Mallampati classification III, limited mouth opening, head extension less than 80º) and a long term diabetes, scheduled for a shoulder arthroscopy.

After checking a proper oxygenation and ventilation, fibreoptic intubation through the AuraGain was carried out.

Key Findings

1. The technique was done without any complication in less than 1 minute and with no hemodynamic incident or desaturation.
2. The laryngeal mask is a secure way to manage difficult airways and a rescue technique in difficult ventilation cases.
3. The limited mouth opening and the poor head extension, probably because of diabetes, made that video laryngoscopes were not an option. The fiberoptic intubation is the right choice in cases of mouth opening limitation.
4. Fibreoptic intubation through AuraGain allowed us to practice quick and secure intubation without any difficulty.

References:

Castro, S. M. *et al.* (2018) 'Tracheal intubation through Ambu AuraGain laryngeal mask during routine clinical practice', *Trends in Anaesthesia and Critical Care*. Elsevier BV, 23, pp. 24–25. doi: 10.1016/j.tacc.2018.09.042.

Ivars, C. *et al.* (2017) 'Fiberoptic intubation through laringeal mask in a patient who had formally refused an awake intubation', *Trends in Anaesthesia and Critical Care*. Elsevier BV, 12, pp. 33–34. doi: 10.1016/j.tacc.2017.01.038.

AuraGain

Which option for ventilation is optimal for resuscitation performed by nurses? Pilot data

Kaminska, H. et al. (2018). Am J Emerg Med. 36: 1710–1711.

5 level

Study Overview

A simulated comparative study to evaluate AuraGain with self-inflating bag vs. bag-mask-valve (BVM) in conditions of simulated cardiopulmonary resuscitation (CPR):

- **Respiratory volume**
- **Ease of performing rescue breath**

Methods

The study comprised of: 38 nurses with a mean work experience of 21.2±11.4 years.

All participants tested both methods in a cross-over manner. The rescue breaths were performed during a 2-minute cycle of resuscitation using two methods.

Key Findings

1. The respiratory volume performed with BVM was 340 ± 84 mL and 485 ± 58 mL for AuraGain with the self-inflating bag (p= 0.003).
2. The easiness of performing rescue breaths was measured by a five-point scale (1=easy ventilation; 5=hard ventilation); in the case of BVM, it was 3.5 ± 0.5 points, while for AuraGain with the self-inflating bag, it was 1.5 ± 0.5 points (p < 0.001).
3. The usage of laryngeal mask with self-inflating bag by the nurses during a simulated CPR was associated with better ventilation of the patient compared to using a self-inflating bag with a face mask.

AuraGain™ Evidence Compendium

AuraGain

Different difficult airway approaches in a 2,5kg neonate: Ambu® AuraGain™, fiberoptic intubation with Airtraq®/through Ambu® AuraGain™

Hervías, M. et al. (2020). Trends Anaesth Crit Care. 30: e167–e168.

4 level

Study Overview

A case study to evaluate AuraGain during a difficult airway management.

Methods

Case: a 2,5 kg new-born with bilateral lip-palate cleft, micrognathia, myelomeningocele and Chiari malformation with difficult airway

- AuraGain was used for MRI on day 7.
- A fibreoptic intubation through the AuraGain was used for the ventriculoperitoneal shunt insertion on day 9.

Key Findings

1. On day 7, spontaneous breathing was maintained.
2. On day 9, when correct ventilation was checked, a FOB inside the ET was used for intubation through the LMA. As the extraction of the LMA could be difficult and lead to possible accidental extubation, the LMA was left with the ET during the procedure and used for safer extubation.
3. No desaturations nor haemodynamic events occurred.
4. LMA & LMA with fibreoptic intubation are good techniques for airway management of the neonate with DA.

References:

Kaminska, H., Gawel, W. B. and Wieczorek, W. (2018) 'Which option for ventilation is optimal for resuscitation performed by nurses? Pilot data', *American Journal of Emergency Medicine*, 36(9), pp. 1710–1711. doi: 10.1016/j.ajem.2018.01.072.

Hervías, M. *et al.* (2020) 'Different diffcult airway approaches in a 2,5kg neonate: Ambu® Auragain™, fiberoptic intubation with Airtraq®/through Ambu® Auragain™', *Trends in Anaesthesia and Critical Care*. Elsevier BV, 30, pp. e167–e168. doi: 10.1016/j.tacc.2019.12.411.

AuraGain

The use of Ambu® AuraGain™ laryngeal mask airway by the lifeguards

Evrin, T. et al. (2018). *Correspondance.* AM J EMERG MED. 36: 2331-2332.

5 level

Study Overview

A simulation study to evaluate lifeguards' skills in maintaining airway using AuraGain:

- **Time to achieve airway patency with SGA**
- **Ease of use (0 = extremely easy, 10 = extremely difficult)**

Methods

The study involved 30 lifeguards & a brief training was provided.

Airway scenarios:

A - Normal airway

B - With an inserted cervical collar

Key Findings

1. The mean time to achieve patent airway with the AuraGain laryngeal mask airway was 15 ± 3 s for normal airways vs. 15.5 ± 4 s for the immobilized cervical spine.
2. The participants assessed the easiness at 3 ± 1.5 points during Scenario A, and 3.5 ± 1 points for scenario B.
3. The lifeguards, after a short training, are capable of maintaining the airway patency with AuraGain. Furthermore, the use of a cervical collar does not impact the time needed for securing airway patency when using the studied supraglottic airway device.

AuraGain™ Evidence Compendium

AuraGain

Awake supraglottic airway guided flexible bronchoscopic intubation in patients with anticipated difficult airways: a case series and narrative review

Lim, W. Y. and Wong, P. (2019). Korean J Anesthesiol. 72: pp. 548–557.

4 level

Study Overview

AuraGain was evaluated in awake Supraglottic Airway Guided Flexible Bronchoscopic Intubation (SAGFBI).

Methods

Ten difficult airway cases were evaluated. Patient age ranged between 42-76 years

SAD size: size 3 for women & size 4 for men

Tracheal tube size: size 3 = 6.5 mm & size 4 = 7.5 mm

Key Findings

1. The technique was successful and well tolerated by all patients, and associated complications were rare.
2. It also offered the advantages of performing an 'awake test insertion' of the SAD, 'awake look' at the periglottic region and 'awake test ventilation'.
3. In certain patients, awake SAGFBI offers advantages over conventional awake FBI or awake video laryngoscopy. More research is required to evaluate its success and failure rates and identify associated complications.

References:

Evrin, T., Iskrzycki, L. and Gawlowski, P. (2018) *The usage of Ambu® AuraGain™ laryngeal mask airway by the lifeguards, Correspondence.* American Journal of Emergency Medicine. doi: 10.1016/j.ajem.2018.04.052.

Lim, W. Y. and Wong, P. (2019) 'Awake supraglottic airway guided difficult airways: a case series and in patients with anticipated flexible bronchoscopic intubation narrative review', *Korean Journal of Anesthesiology*, 72(6), pp. 548–557. Available at: https://pubmed.ncbi.nlm.nih.gov/31475506/.

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